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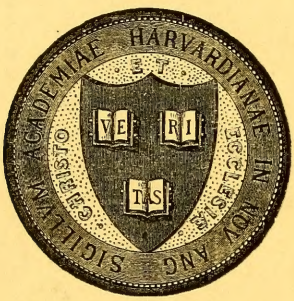

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The official publications of THE OTTAWA FIELD-NATURALISTS' CLUB have been issued since 1879. The first were *The Transactions of the Ottawa Field-Naturalists' Club*, 1879-1886, two volumes; the next, *The Ottawa Naturalist*, 1886-1919, thirty-two volumes; and these have been continued by *The Canadian Field-Naturalist* to date. *The Canadian Field-Naturalist* is issued monthly, except for the months of June, July and August. Its scope is the publication of the results of original research in all departments of Natural History.

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VOL. XLVIII OTTAWA, CANADA, JANUARY, 1934 No. 1

RECLASSIFICATION OF THE FOSSIL UNIONIDÆ (FRESH-WATER MUSSELS) OF WESTERN CANADA[1]

By LORIS S. RUSSELL

FOR SOME TIME the writer has had in preparation a complete revision of the fossil non-marine Mollusca from western Canada. At present only the section on the Unionidae is finished. A summary of the writer's conclusions on this family is offered here, so that the revised nomenclature may be available for other studies. Criticisms of the scheme outlined will be appreciated.

For many years the living North American Unionidae were grouped in the three genera *Margaritana, Unio* and *Anodonta*. Naturally this system was followed by the palaeontologists. The great diversity of form within the family ultimately led to more detailed classification. Study of the soft parts revealed that the gills, especially in their modification as larval pouches, afforded the best basis for a natural arrangement. This was first completed by C. T. Simpson[2] and later revised by A. E. Ortmann[3].

Unfortunately, such a classification based on soft parts cannot be applied directly to fossil material, and up to the present most palaeontologists have followed the old method, referring the majority of extinct species to the genus *Unio* in the broadest sense. The time has come when the convenience of this method is outweighed by its obsolescence. Some attempt, however tentative, must be made toward the adoption of a nomenclature that expresses the probable relationship of the fossil to the living species. The writer's method involves the conchological comparison of the fossil with living genera and species. The resultant classification is artificial, and probably false in part, but no other procedure appears possible if the systematic arrangement of the fossil Unionidae is to be modernized.

Family UNIONIDAE D'Orbigny

Subfamily UNIONINAE Swainson

Genus *Fusconaia* Simpson

Fusconaia dawsoni (Russell)

Unio dawsoni, Russell, Roy. Soc. Canada, Trans., ser. 3, vol. 25, sec. 4, p. 9, pl. 1, figs. 1, 2, 1931.

Edmonton formation, Upper Cretaceous, Bow River, Alberta. This species has the typical form of a *Fusconaia,* and may be compared with *F. flava trigona* (Lea).

Fusconaia tuchiasana (Russell)

Unio tuchiasana, Russell, Roy. Canad. Instit., Trans., vol. 18, p. 340, pl. 1, figs. 4-6, 1932.

Upper Ravenscrag formation (Paleocene), southern Saskatchewan. This species is referred to *Fusconaia* because of the abbreviated and convex shell, the anteriorly inclined beak, and the unsculptured surface. In outline the shell is more like that in certain species of *Amblema,* such as *A. plicata* (Say).

Fusconaia cryptorhynchus (White)

Unio cryptorhynchus, White, U.S. Geol. Surv. Terr., Ann. Rept., 1878, pt. 1, p. 68, pl. 24, figs. 1a, 1b, 1883.

Judith River formation (Upper Cretaceous) of Montana and equivalent beds in southern Alberta. The shell in this species is somewhat more elongate than is typical of *Fusconaia,* but the beak structure and form of umbonal sinus and ridge may be compared with those in varieties of *F. flava* (Raf.)

Fusconaia? danae (Meek and Hayden)

Unio danae, Meek, U.S. Geol. Surv. Terr., Rept., vol. 9, p. 517, pl. 41, figs. 3a-3c, 1876.

Upper Cretaceous and Paleocene of Saskatchewan, Alberta, Montana and Wyoming. This is excessively elongate compared with modern members of *Fusconaia,* but in other shell characters agrees well with that genus.

---

[1] Published with the permission of the Director, Geological Survey, Department of Mines, Ottawa.

[2] "Synopsis of the Naiades or pearly fresh-water mussels", U. S. National Mus., Proc., vol 22, pp. 501-1044, 1900. "A descriptive catalogue of the Naiades, or pearly fresh-water mussels", Detroit Michigan, 1914.

[3] "Notes on the families and genera of the Najades", Carnegie Mus., Annals, vol. 8, pp. 222-365, figs. 1-28, pls. 18-20, 1911. "Monograph on the Najades of Pennsylvania", Carnegie Mus., Mem., vol. 4, pp. 279-347, figs. 1-8, pls. 86-89, 1912, vol. 8, pp. 1-384, figs. 1-34, pls. 1-21, 1919.

Genus *Quadrula* Rafinesque.

Quadrula natosini (McLearn)

Unio natosini, McLearn, Nat. Mus. Canada, Bull. No. 58, p. 73, pl. 13, figs. 7-9, 1929.

Lower Cretaceous of southern Alberta and western Montana. In general features the ornamentation of this species is strikingly like that of *Quadrula* (or *Tritogonia*) *verrucosa* (Raf.), although there are differences in details, and in the shape of the shell.

Quadrula mclearni (Dyer)

Unio mclearni, Dyer, Nat. Mus. Canada, Bull. No. 63, p. 7, pl. 3, fig. 15, 1930.

Foremost beds (Upper Cretaceous) of Alberta. On the basis of shape and ornamentation this species may be referred with confidence to *Quadrula.*

Quadrula holmesiana (White)

Unio holmesianus, White, U.S. Geol Surv., Terr., Ann. Rept., 1878, pt. 1, p 67, pl. 22, figs. 4a-4e, 1883.

Occurs in the Upper Cretaceous from New Mexico to Alberta, in continental beds above the youngest Pierre shales. The species probably was derived from *Q. mclearni,* from which it may be distinguished by the more convex shell, and the nodose, rather than costate, ornamentation.

Quadrula subprimaevus (Dyer)

Unio subprimaevus, Dyer, Nat. Mus. Canada, Bull. No. 63, p. 7, pl. 3, fig 2, 1930.

Foremost beds of Alberta. Suggests some of the more elongate species of *Quadrula,* such as *Q. cylindrica* (Say).

Quadrula primaevus (White)

Unio primaevus, White, U.S. Geol. Surv., Terr., Ann. Rept., 1878, pt. 1, p. 70, pl. 29, figs. 3a, 3b, 1883.

Judith River formation (Upper Cretaceous) of Montana and equivalent beds in southern Alberta. This species is closely related to, perhaps derived from, *Q. subprimaevus,* but may be distinguished by larger size, more prominent and less anteriorly placed beak, and more complex ornamentation.

Genus *Pleurobema* Rafinesque

Pleurobema dowlingi (McLearn)

Unio dowlingi, McLearn, Geol. Surv. Canada, Mus. Bull. No. 29, p. 11, pl. 4, fig. 2, 1919.

Dunvegan formation (Upper Cretaceous), northwestern Alberta. This species may be compared with the more elongate varieties of *P. obliquum* (Lam.).

Pleurobema humei (Dyer)

Unio humei, Dyer, Nat. Mus. Canada, Bull. No. 63, p. 8, pl. 4, figs. 1, 4, 1930.

Pale beds (Upper Cretaceous), southern Alberta. The prominent beak distinguishes this species from most members of *Pleurobema,* but a very similar form of shell is present in the living *P. coccineum catillus* (Conrad).

Genus *Elliptio* Rafinesque

Elliptio hubbardi (Gabb)

Unio hubbardi, Gabb, Geol. Surv. California, Palaeont., vol. 2, p. 190, pl. 30, figs. 86, 86a, 1869.

Lower Cretaceous, Queen Charlotte Islands, British Columbia. The shell of this species is much more convex than that usually found in *Elliptio,* but may be compared with *E. niger* (Raf.)

Elliptio nanaimoensis (Whiteaves)

Unio nanaimoensis, Whiteaves, Ottawa Naturalist, vol. 14, p. 177, figs. 1, 1a, 1901.

Nanaimo group (Upper Cretaceous), Nanaimo, British Columbia. This species has the typical *Elliptio* shape, and closely resembles several modern examples. Compare with *E. dilatus* (Raf.) and *E. violaceus* (Spengler).

Elliptio supragibbosus (Whiteaves)

Unio supragibbosus, Whiteaves, Geol. Surv. Canada, Contrib. Can. Pal., vol. 1, p. 66, pl. 10, fig. 1, 1885.

Foremost beds, southern Alberta. Although the beak sculpture of this species is not preserved, the compressed form, and general outline, of the shell strongly indicate the genus *Elliptio.*

Subgenus *Protelliptio,* nov.

Shell of medium size, elongate-ovoid. Beak low, sculptured with numerous regular concentric plications extending onto the disc, with posterior loop more or less developed; two narrowly divergent, posterior dorsal lines sometimes present. Posterodorsal surface of shell usually marked by radiating, upcurved, *Lasmigona*-like plications. Umbonal ridge poorly developed. Genotype, *Unio biornatus* Russell.

The three species referred to this subgenus form a well characterized group, which merges into the next subgenus, and through it is connected with the modern *Elliptio.*

Elliptio biornatus (Russell)

Unio biornatus, Russell, Roy. Soc.. Canada, Trans., ser. 3, vol. 26, sec. 4, p. 1, pl. 1, fig. 1, 1932.

McMurray formation (Lower Cretaceous), northeastern Alberta.

Elliptio hamili (McLearn)

Unio hamili, McLearn, Nat. Mus. Canada, Bull. No. 58, p. 73, pl. 13, figs. 1-4; pl. 14, fig. 6, 1929.

Blairmore formation (Lower Cretaceous), southern Alberta.

Elliptio douglassi (Stanton)

Unio douglassi, Stanton, Amer. Philos. Soc., Proc., vol. 42, p. 195, pl. 4, figs. 3, 4, 1903.

Lower Cretaceous of southern Alberta and western Montana.

Subgenus *Plesielliptio,* nov.

Shell of medium size, narrowly to broadly ovoid. Beak sculptured with a few fine, close-set plications, concentric or double-looped, and having two slightly divergent, straight or gently curved lines directed posteroventrally. No posterior radiating ornamentation. Other shell characters as in the typical *Elliptio.* Genotype, *Unio priscus* Meek and Hayden.

Besides the species listed below, the following are included in this subgenus: *Unio vetustus* Meek, *U. neomexicanus* Stanton, *U. mendax* White, *U. wasatchensis* Cockerell.

Elliptio priscus (Meek and Hayden)

Unio priscus, Meek, U.S. Geol. Surv. Terr., Rept., vol. 9, p. 516, pl. 43, figs. 8a-8d, 1876.

Upper Cretaceous and Paleocene of Montana, Alberta and Saskatchewan. This species compares well with several modern members of *Elliptio,* such as *E. violaceus* (Spengler).

Elliptio abbreviatus (Stanton)

Unio priscus, var. *abbreviatus,* Stanton, U.S. Geol. Surv., Bull. No. 257, p. 108, pl. 12, figs. 2-4, 1905.

Judith River formation (Upper Cretaceous) of Montana and equivalent beds in southern Alberta. The principal reason for regarding this form as a variety of *"U". priscus* is the similarity of beak sculpture. In the present revision this character is regarded as subgeneric in rank. The shell form in the present species is quite distinctive, and seems to justify an equal rank with other members of *Plesielliptio.*

Subfamily ANODONTINAE Ortmann

Genus *Anodonta* Lamarck

Three fossil species of edentulous Unionidae occur in western Canada: *A. propatoris* White, Pale beds of Alberta; *A. macconnelli* Russell, Eastend formation of Saskatchewan; *A. argillensis* Russell, Whitemud formation of Saskatchewan. No systematic revision of these species is necessary at present.

Subfamily LAMPSILINAE Ortmann

Genus *Medionidus* Simpson

Medionidus? senectus (White)

Unio senectus, White, U.S. Geol. Surv., Terr., Ann. Rept., 1878, pt. 1, p. 69, pl. 28, figs. 1a-1c, 1883.

Upper Cretaceous and Paleocene of North Dakota, Montana, Saskatchewan and Alberta. The generic reference of this species is based on the ornamentation, and is doubtful. Similar markings occur in shells of *Lasmigona* Raf., *Alasmidonta* Say and *Ptychobranchus* Simpson. It is impossible or improbable that *"Unio" senectus* pertains to any of these three genera, but it is likely that it represents an independent and extinct group, possibly derived from *Elliptio biornatus* of the Lower Cretaceous.

Genus *Lampsilis* Rafinesque

Lampsilis farri (Stanton)

Unio farri, Stanton, Amer. Philos. Soc., Proc., vol. 42, p. 194, pl. 4, figs. 1, 2, 1903.

Lower Cretaceous of southern Alberta and western Montana. Closely resembles in outline the young shell of several living species, such as *L. siliquoidea* (Barnes).

Lampsilis consueta (Whiteaves)

Unio consuetus, Whiteaves, Geol. Surv. Canada, Contrib. Can. Pal., vol. 1, p. 59, pl. 9, figs 4, 4a, 1885.

Pale beds and Edmonton formation (Upper Cretaceous) of Alberta. This species suggests the more elongate of living *Lampsilis,* such as *L. anodontoides* (Lea).

Lampsilis sandersoni (Warren)

Unio sandersoni, Warren, Roy. Soc. Canada, Trans., ser. 3, vol. 20, sec. 4, p. 5, pl. 1, fig. 1, 1926.

Edmonton formation (Upper Cretaceous), central Alberta. The shell form in this species may be compared with that of *L. ovata* (Say).

Genus *Micromya* Agassiz

Micromya minima (Warren)

Unio minimus, Warren, Roy. Soc. Canada, Trans., ser. 3, vol. 20, sec. 4, p. 5, pl. 1, figs. 2, 3, 1926.

Edmonton formation (Upper Cretaceous), cen-

tral Alberta. The shell of this species is comparable in size and shape with that of *M. fabalis* (Lea).

Genus *Dysnomia* Agassiz

Dysnomia tyrrelli (Russell)

Unio tyrrelli, Russell, Roy. Soc. Canada, Trans., ser. 3, vol. 25, sec. 4, p. 10, pl. 1, figs. 3, 4, 1931.

Edmonton beds (Upper Cretaceous), west central Alberta. This species apparently pertains to the subgenus *Truncillopsis* Ortmann and Walker, and may be compared with *D. brevidens* (Lea).

OTHER SPECIES

Unio albertensis Whiteaves[4] was based on poorly preserved shells of generalized shape from the St. Mary River formation (Upper Cretaceous) of Alberta. This species is indeterminate at present, but it may prove to be an *Elliptio.*

Murraia naiadiformis Russell[5], from the Lower Cretaceous of northeastern Alberta, was referred with question to the Unionidae. Further study suggests that the species pertains to the Mutelidae, or at least parallels that family in the character of the dentition.

[4] Geol. Surv. Canada, Contrib. Can. Pal., vol. 1, p. 3, pl. 1, fig. 1, 1885.

[5] Roy. Soc. Canada, Trans., ser. 3, vol. 26, sec. 4, p. 2, pl. 1, figs. 2-4, 1932.

ON THE BEHAVIOUR OF THE LONG-FINNED SQUID (*Loligo pealii,* (*Lesueur*)).

By J. A. STEVENSON
Queen's University, Kingston.

INTRODUCTION.

DURING the spring of 1932, a weir of stakes and brushwood was erected on the shore at low-water mark in front of the Biological Station at St. Andrews. This weir consisted of two arms, the one reaching to one side, and the other, at an angle of about 90 degrees, to the opposite side, of a depression between two ridges of rocks, that extended from low to high-water mark. The two arms of the weir joined in the centre of this depression, the lower end of which was thus completely closed in by the weir. This was so constructed that when it was left bare by the receding tide, a pond remained at the angle of the two arms. In this pond, such animals as happened to have been trapped by the receding tide could remain alive until attended to. A drain-pipe led from the pond to the seaward side of the weir, permitting the drainage of the water in the pond if necessary. Fish and other animals that ventured between the weir and the shore at high tide found their retreat to the sea cut off by the arms of the weir; and at low tide, their only place of refuge was in the weir pond.

Observations were made throughout the summer upon the animals that were caught in this weir. It was noticed early in the summer that the long-finned squid (*Loligo pealii*) occurred frequently; so the opportunity was taken for making the following notes upon the behaviour of these extremely interesting animals.

OBSERVATIONS.

The squids swam into the weir in schools. Assuming that those present in the weir comprised at least one whole school, the number of individuals in a school varied considerably. It is probable that on occasions when many hundreds were taken at one tide, more than one school was represented. A fairly average figure for squids present in the weir at one tide was from a hundred and fifty to two hundred. However, early in the season the numbers were considerably below this; a fact which would be probably explained by the inshore summer migration not yet having properly started. Observation indicated that the schools of squids occurring at the Biological Station increased somewhat in size until the middle of August, after which they decreased.

When trapped in the weir at low tide, the squids collected together at the deepest part of the pond, and remained, when undisturbed, quietly oscillating to and fro an inch or two off the bottom, close together and all facing one direction or the opposite. When they were not alarmed, their colour was generally a rich red-brown, all over their bodies. As long as they were not disturbed, they would behave quietly like this, their fins undulating and acting as elevators to the posterior ends of their bodies. Their movement was alternately forwards and backwards, with an amplitude of a few inches. The arms were spread in such a way that they formed a vane that alternately adjusted itself to forward and back-

ward movement, so as to elevate the fore-part of the animal (Figure 1).

When a small pebble was thrown into the water immediately above the school, causing sufficient splash to alarm the squids mildly, they responded immediately and in practically every case by suddenly darting, either forwards or backwards, depending upon their position, away from the source of the disturbance. Their colour would flash suddenly to a pallid white, but after a few moments would regain the normal red-brown. Some, in darting back, would eject a small cloud of sepia. This only occurred in a small percentage of individuals, however.

The squids would dart away from the splash for a few feet, then collect together, all facing it. If in their rush they had gone too near the edge of the pond, they would advance head-foremost, slowly, towards the deeper water, ready on an instant to dart back again if danger threatened. After about three minutes, if there were no more disturbance, they would finally take up their original position in the deepest part of the pool.

When, instead of a small pebble, a large rock was thrown into the pool, sufficient to cause a big splash and thoroughly scare the squids, a somewhat different and very interesting reaction was observed. Immediately the rock struck the water, the first reaction of the squids was to dart away from the splash. Some ejected a little ink. When, however, the magnitude of the disturbance became apparent, they completely changed their tactics. Every single squid in the school immediately did two things; it sank like a stone to the bottom of the pond, and it changed its colour in such a way as to harmonize with that of the bottom. When the ripples from the splash had subsided, it was at first very hard to understand the apparently complete disappearance of the school. Closer observation, however, revealed the squids lying absolutely motionless on the bottom. This they continued to do for fully five minutes, when, the danger apparently past, one by one they arose from the bottom, assumed their natural red-brown colour, and continued their normal oscillating movement. The colour-scheme of the squids when frightened and "playing 'possum" consisted of a whitish background, with three or four red-brown bands of expanded chromatophores across the dorsal surface. One of these bands was always present across the head. (Figure 2).

It is easy to understand how the squids could benefit by this extremely effective defence method of protective colouration. As long as they remained absolutely still on the bottom, it is not probable that a predatory fish or other animal intent upon eating them would ever notice them in this state, so closely do they resemble the bottom.

It was noticed that the squids would often lie on the bottom in the same manner, after they had been put to undue exertion. When, for instance, they had been chased around the pool several times, they often lay upon the bottom as if recuperating after the exertion of swimming. The ejection of ink also appeared to fatigue them considerably, since they generally rested a while after it.

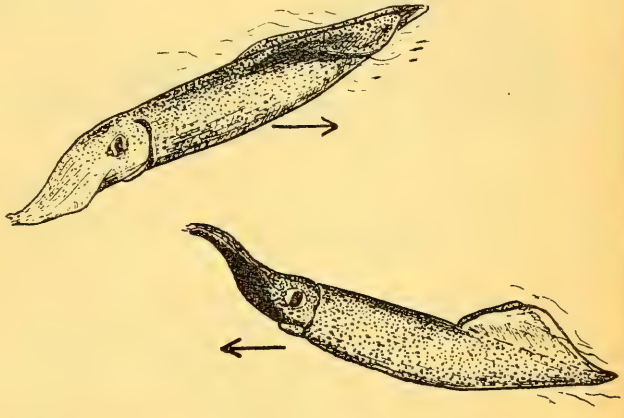

FIGURE I.—*Positions assumed by Loligo when oscillating backwards and forwards in the water.*

Observations made over the weir from a rowboat at high tide showed the squids swimming in schools in mid-water. The squids in one school did not swim very close together, but they never lost each other. When not disturbed their motion was forwards; but when the water was splashed with an oar, they shot away backwards. Their siphons were used constantly for both forward and backward swimming.

The largest *Loligo pealii* that have been examined by the writer during the present investigation measured 48 cms. from the posterior end of the mantle to the tips of the longest sessile arms; and the smallest measured only 10 cms. The average size, however, was from 22 to 27 cms. Females were found to be slightly smaller than males, and all the very large specimens opened were males.

Throughout the summer, whenever, large numbers of squids were trapped in the weir, it was

noticed that a large proportion of them stranded on the shore, even at half-tide. Their movements were watched one day (July 30) at about half-tide. It appeared that they were trying to seek an escape, on finding their retreat seawards blocked by the weir, by exploring around the edge of the enclosed water. When one hit a bunch of seaweed, it would shoot either directly away from, or directly into it; generally the latter. It would struggle vainly for a few minutes in an endeavour to extricate itself from the weed. Finally it would calm down and rest on the bottom.

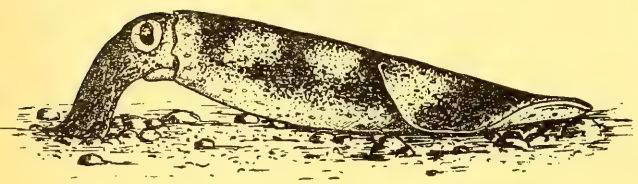

FIGURE II—*Colour-scheme and characteristic pose of Loligo Pealii when frightened.*

It would remain thus until the tide would leave it high and dry, and would only seem to realize its predicament when it could not possibly save itself. Its struggles would then be extremely violent, as it tried to regain the water. Finally it would succumb to lack of water and the heat of the sun.

Other squids, exploring to find a way to the sea, would appear to become panicky, and dash violently about, sooner or later running ashore when, due to the force of their dashes, they would find that they could not get back; and would succumb also to lack of water and the heat of the sun. They showed very little resistance to such exposure, generally dying in the course of two or three minutes.

The spawning activities of *Loligo* have been studied carefully by Drew (*Jour. Morph.*, 1911 & 1919). Squids were seen to be spawning during the summer of 1932 in the tidal pool opposite the Biological Station at St. Andrew's. The following observations were made:

On the evening of August 23, twenty-five *Loligo* were seen to be swimming about in the tidal pool, which is near high tide mark. Upon observation, it was seen that there was a small bunch (about 10) of egg-capsules attached to a piece of weed on the bottom, in about three and a half feet of water. A large male squid with a frayed fin was swimming beside a smaller one (presumably a female) close to the egg-bunch, which it did not leave. The rest of the squids did not appear to approach the pair closely. Next morning (August 24), after the tide had been in and ebbed once, the twenty-five squid were still in the pool, in which they had apparently chosen to remain at high tide. The egg-bunch seemed to consist of about the same number of capsules. The large male of the evening before, recognized by its frayed fin, was seen by itself patrolling back and forth past the egg-bunch. There was no pairing together among the squids in daylight. Whenever another squid approached to within about six feet of the eggs, the large male dashed towards it and drove it away, generally edging it off in the same manner in which a sheep-dog drives sheep. The other squids seemed very curious, and were continually striving to reach the eggs, generally being driven away by the large male. This specimen was the largest squid in the pool. Some did manage to reach the eggs, which they appeared to grasp in their arms and shake violently. Later in the day, when the heat became more intense and the water in the pool warm, some of the squids were observed resting in their characteristic position on the bottom; but another large male, distinguished as such by its size and by the absence of any fraying on its fins, had taken up the position formerly occupied by the largest male, which now, too, was resting. Later in the day, the largest male was again back in its place on guard.

On August 25, the egg-bunch was seen to have increased in size, there being about twenty capsules. The large male was still on guard, though it was seen frequently to be resting on the bottom near the eggs. All the twenty-five squids had remained in the pool throughout two flood tides. The fact that the egg-bunch contained so many capsules seemed to show that it was the product not of one, but of many female squids. In the dissection of female squids throughout the summer, it was found that only four, rarely five or six, capsules were ripe at the same time; hence deposited at about the same time. Drew (1911) states that he observed one female to deposit no less than twenty-three egg-capsules in an hour and thirty-five minutes in the Woods Hole aquarium. Possibly conditions further south are different; but no female squids upon dissection at St. Andrew's showed nearly as many mature or even partially mature capsules as this. It is possible that the egg-bunch up to this date had

been produced by five or six female squids that were in the tidal pool school The observations also lead to the belief that the eggs were nearly all fertilised by the same large male, which was the only one in the school to be seen pairing.

August 26; the egg-bunch had again increased slightly, and the same large male was on guard. All twenty-five squids were still in the pond. On the next day, however, all the squids had disappeared, leaving the egg-bunch in the pool.

The above observations seem to show clearly that the "parental instinct", if it can be called such, is found in *Loligo pealii*. The writer has seen no reference to this habit of the male guarding the egg-capsules in any papers upon *Loligo*, and Mr. Robson of the British Museum (Mollusca) informs us that he, too, had not heard of such an instance.

On and after August 27, when the squids left the tidal pool and the eggs, it was noted that few or no squids were taken daily in the weir itself. Possibly the winter migration to deep water had begun.

NOTES ON CERTAIN RECENTLY DESCRIBED DINOSAURS[1]

By C. M. STERNBERG

IN A RECENT PAPER (University of Toronto Studies. Geological Series No. 34, August, 1933) Dr. W. A. Parks describes three new species of theropod dinosaurs and three new turtles A careful study of the descriptions of the dinosaurs leaves some doubt as to the proper assignment of two of the species.

In *The Canadian Field-Naturalist* for May, 1933 pp. 79-83, the writer described a new species of theropod dinosaur as *Ornithomimus edmontonicus*. Comparison of the description and splendid illustrations, especially of the manus and fore limb, of *Struthiomimus currellii* Parks with the type of *O. edmontonicus* Sternberg suggests that they are co-specific. The question as to whether the species should be referred to *Ornithomimus* or *Struthiomimus* was fully discussed in the description of *O. edmontonicus* Sternberg. As far as the specimens can be compared, they seem to be similar in practically all details in which they differ from previously described species.

In the slender fore limb and the very long slender manus with Mc. I longest and not divergent, and the uniform length of the digits, the two specimens are similar. The only noticeable difference shown in the fore limb is the relatively longer humerus in our specimen. This might be partly accounted for by straightening and crushing.

Likewise, the pes of Dr. Parks' specimen is relatively elongate and very slender. The differences in measurements of the individual phalanges is doubtless due to the fact that those given for *O. edmontonicus* Sternberg are the over all measurements, for the lengths of the articulated digits are similar.

The two specimens are of about equal size and the relative length of the limbs is similar. Both were collected from the same horizon in the Edmonton formation and within a radius of five miles.[2]

The other specimen in question consists of the left metatarsus and is described as *Ornithomimus elegans* Parks. It was collected from the Belly River formation, below the mouth of Berry Creek, Red Deer River, Alberta.

The very fine illustration shows that Metatarsal III was not reduced proximally or greatly expanded distally but that it was of uniform size throughout and approximately the same size as Mts. II and IV. The distal end is only slightly broader than that of Mts. II and IV and the distal half of the bone is roughly quadrate in cross section. These are all characteristic features of the Coeluridae. In all members of the Ornithomimidae Mt. III is broadly expanded distally and the lower portion of the shaft, above the articulation, is triangular in cross section with the anterior face broadly expanded and overlapping Mts. II and IV and the acute posterior angle wedged in between these metatarsals. In the upper half Mt. III is much reduced and almost or quite pinched out between Mts. II and IV. It would, therefore, seem to the writer that Dr. Parks' specimen should have been referred to the Coeluridae instead of the Ornithomimidae.

In May, 1932, the writer described a new genus and species of coelurid dinosaur as *Stenonycho-*

[1] Published with the permission of the Director of the Geological Survey of Canada.

[2] Since preparing these notes Dr. Parks has informed the writer that his paper was sent to press before he received the description of *O. edmontonicus*.

saurus inequalis.[3] This specimen comes from the same general locality and horizon as that from which Dr. Parkes' specimen was collected. It would appear that this paper was overlooked.

Dr. Parks' specimen seems to differ from the metatarsus of *S. inequalis* Sternberg only in size and relative length of Mt. II. The uniform breadth of the articulated metatarsus; the subequal breadth of the metatarsals throughout; the slight constriction of the shaft above the articulation and the divergent articulation of Mt. II; and the well developed Mt. III, with transversely flattened palmar surface, all agree with *S. inequalis* Sternberg. The longitudinal, somewhat roughened, ridge on the palmar side, below midlength, of Mt. II, in Dr. Parks' specimen, no doubt represents the surface of attachment for Mt. I. In our articulated foot there is a like swelling, similarly located, on Mt. II, just above and opposite Mt. I.

It is fully recognized that Dr. Parks' specimen might belong to *Chirostenotes*, in which the metatarsus is not known, as this genus falls within the Coeluridae, but it can hardly belong to *Ornithomimus*.

[3] *Can. Field-Nat.*, 46: 99-105, 1932.

NOTES ON THE REARING OF CAPTIVE YOUNG MEADOW JUMPING MICE

By H. ROY IVOR
Honorary Game Officer

THE REARING of a family of very young mice would appear to be not only a problem but a queer task to set oneself. What else could one do, however, upon accidentally tearing apart the home of one of those rarely seen and very odd little animals, the Meadow Jumping Mouse, and finding a family of five velvety soft and helpless youngsters?

Mice in general are considered pests and usually the young as well as the adults are killed on sight. Let the writer confess, however, that when he finds a beautiful white-footed mouse, or even a field mouse, when they cannot seem to do any harm, he lets them have their lives. Consequently it seemed quite impossible to destroy these harmless juveniles. Yet, knowing nothing whatever about how to raise them, it was a puzzling problem which we had to solve. Unquestionably a task, it proved, however, amusing, interesting and decidedly worth-while (for once) and perhaps an account of our experience may interest other readers of *The Canadian Field-Naturalist* and possibly add some data to the comparatively little-known life history of this handsome rodent.

In late August, 1931, one of our employees turned up the nest of a Meadow Jumping Mouse, containing five young, in our humus deposit at Erindale, Peel County, Ontario. During the previous spring the humus had been cultivated and the refuse left in rows of about a foot in height. It was in one of these rows that the parent mouse had built her nest. The ridge was quite dry. The humus deposit had a sparse growth of weeds between the rows in the immediate neighbourhood of the nest and about fifty feet away there was a fairly dense undergrowth.

The finder of the nest had just placed the young mice on a pile of humus as we arrived and had cast the nest aside. We paid no attention to the nest itself, other than a casual glance, and therefore we cannot say accurately of what it was composed. The impression, however, is that it was made from old jute sacking, finely shredded, as a quantity of this sacking had been lying around the spot for some time.

The five youngsters were huddled together, trying actively to get as close together as possible. They were small, no more than two inches in length excluding the tail (which was of an exceptional length for mice) and were fully covered with a very silky mole-like fur of a beautiful light fawn colour. Their eyes were closed and whether or not they could be opened, but were not on account of the light, was not determined. From the fact that their tails definitely lacked any white tip and from the situation of the nest we feel safe in concluding that they were individuals of the Meadow Jumping Mouse, *Zapus hudsonius hudsonius*. Our identification of the mice was corroborated later when we secured a series of snapshots of them and submitted them to Messrs. L. L. Snyder and J. L. Baillie, Jr., of the Royal Ontario Museum of Zoology, who unhesitatingly referred them to

this species.

The quintette of "nestlings" was brought to the house in one closed hand and put into a wire canary-breeding-cage covered with cotton mosquito netting and the bottom of the cage covered with dry grass. For a nest we used a very soft piece of heavy, downy cotton with a piece of woollen blanket over it. The mice immediately curled up together, as close to one another as they could get, inside the nest, and apparently slept all the time with the exception of the periods when they were fed.

How to feed and what to feed them on constituted our next problems. This proved to be, as we expected, a task, for the reason that, in our opinion, right or wrong, they should be fed frequently. We mixed one teaspoonful of milk with two of water and added a little cream or evaporated milk in a two ounce bottle and heated it by placing it in a bottle of warm water. We then procured a medicine dropper and placed in its opening a hollow grass stem which fitted snugly. We found that without the grass stem the mice would not take the milk, but as soon as this was used we had no further trouble.

One of the captives would take the stem in its mouth and, as the bulb was gently pressed, would drink. It was only a short time until they started strenuous competition for the dropper. It was most amusing to us to see one stand on its hind legs, grasping the straw with its two front paws (using them like hands) and suck the straw. The difficulty was in keeping the straw in its mouth, as while one had it, the other four were crowding, pushing him in the face with their front feet or climbing on top of him. Feeding time occurred every half hour or even more often, and was a time of continual fighting for the bottle!

Occasionally one of them would get too much at a time and would choke and sputter, and it required very careful pressure of the bulb to overcome this difficulty. Also the milk apparently had to have a little cream added or they did not like it! Too, it had to be perfectly sweet and at a temperature just lukewarm. Twice it was either slightly turned or too cold and on both these occasions we found them later, lying as if dead, although they were soon revived by being placed in a warm situation for a short while.

They had no fear of us, were very tame and the five of them would come into the hand and feed. However, they were of an extremely nervous temperament, amounting almost to a panic, during fright, when the slightest sound would make them jump; and how they could jump! They were as quick as a flash.

They came to know the one who fed them and also a little whistle by which they were called when food was ready. They were very friendly with one another but we never saw them play. When asleep they curled together into a ball.

A very slight difference in their development was apparent and we could tell the "oldest" from the "youngest" after we had had them for a week or more. The "oldest" was very slightly larger than the others and was the first to use its eyes. The individual which we believed to be the youngest was the last to do so. When their eyes were opened we found that strong light seemed to bother them, but as they got older this was not apparent.

These youngsters did not seem to possess any instinctive habits of sanitation and the nest had to be changed frequently. The oldest began to eat seeds about two weeks after we secured the family, and very shortly afterwards the others began. It was impossible to tell whether they ate each kind of seed or not, but they did show a marked preference for millet. As long as we had the litter, however, they were exceedingly fond of milk.

One morning when we went to feed them, the oldest was missing. It had squeezed through the netting, which had not been fastened as closely as it should have been. We never saw this individual again. The others were then placed in a box which we covered with wire netting, leaving a space covered with wood through which the hand could be put. The wooden covering must have been placed carelessly a couple of nights later, for in the morning three of them were out, one being found in the dining-room, and one in the garden near the house. Both submitted to capture without much objection. The third we did not find.

On another occasion, one of the family had escaped and managed to fall down the cold-air register into the outer casing of the furnace. With the aid of a candle, mirror, cage and much patience, however, it was recovered.

About this time we noticed a change taking place in their colour, but this had probably begun before we noticed it. The hair showed through the fur at this stage and was much darker. Before they were released, in less than a month's time, they were quite dark.

From our experience we believed them to be nocturnal. Although they came from their nest

occasionally in the daytime to feed on seed, it was after dusk and during the evening that they were most active.

They, by this time, seemed to be able to look after themselves, so after giving them a drink and some bread soaked in milk, of which they had become fond, we took them to the back of our woods. Here, in a swampy place where we had seen jumping mice, we left their nest with a large quantity of seeds in it, under an old stump. Revisiting the spot the next morning we saw no sign of them.

Although it proved to be quite an undertaking to rear these young jumping mice from babyhood, it was well worth-while, even if only for the amusement at feeding time. We and our friends had many a hearty laugh over their antics as each of the mice endeavoured to take the straw from the others. They were unquestionably not as well developed as they should have been at their age and were rather thin. Our feeding was doubtless at fault, we having had no previous experience with tiny animals, but we at least reared them so that they were active and apparently capable of subsisting by their own efforts when released.

(*ERUCASTRUM GALLICUM*)—A SLY INTRUDER

By HERBERT GROH

IN AN ARTICLE on "Some Recently Noticed Mustards", contributed to *Scientific Agriculture*, July, 1933, one of the species discussed was *Erucastrum gallicum* (Willd.) O. E. Schultz., both species and genus unrecorded previously in Canada. Since the article was prepared, a number of other records secured in 1933, have considerably extended the range, and may be presented for publication here.

The first American records were published in *Rhodora* in 1911, by Dr. B. L. Robinson, one of these dating back to 1903, being from Wisconsin, and another, which was the immediate occasion of the note, from Massachusetts. The weed, which has received the common name dog mustard, has become fairly widespread, and has been found as far west as Glacier National Park, Montana.

Although only now reported in Canada, the first collection of this plant, was made by myself as early as July, 1922, but was laid aside unnamed. Significantly enough, this earliest record was from Emerson, Man., right on the International Boundary, and due north of prior infestations along the Red River.

Interest in the identity of the specimens which had accumulated in the Division of Botany, was stimulated in the fall of 1931, by the receipt of material from Manitoba, as well as from Ontario, along with evidence of really aggressive tendencies. It was not until after another season's fruitful weed surveys, however, that the name was correctly ascertained; and the full force of our rather culpable Canadian blindness to its persistent appeals for recognition at last burst upon us.

When the available material was assembled at the end of 1932, it was found that more than 30 stations for the weed were known, and mostly authenticated by specimens in the Division Herbarium. These were distributed over about 2500 miles of longitude from Charlottetown, P.E. I. to Scott, Sask., as follows:

P.E.I., one record, 1926; N.S., one, 1932; Que., five, 1927 and later; Ont., six, 1925 and later; Man., thirteen, 1922 and later; Sask., seven, 1932. Seven of these records were contributed by correspondents of the Division, and many others were secured in the course of motor travel kindly made possible by field officers of the Federal and Provincial Departments of Agriculture, chiefly on other quests.

As already intimated, weed surveys in 1933 have added to the above information. The range is now no farther west, but has been extended north to St. Walburg, Sask., at present the terminus of a branch railway, running northwest of Battleford for about 80 miles. The stations to be placed on record for 1933 are as follows:

Ottawa, Ont., July 11. (W H. Minshall)—On a railway embankment skirting Hintonburgh. This is the first record for the Ottawa district.

Kirk's Ferry, Que., (Reported independently by W. H. Wright and H. Groh)—Railway bed for the entire length of the station yard.

Regina, Sask. (Reported by W. G. Palmer).

Weyburn, and Lewvan, Sask. July 28. (These and the following all recorded by H. Groh)—All from railway premises.

Melvile, Sask., July 31.

Yorkton and Zehner, Sask., August 1.

St. Walburg and Turtleford. Sask., August 20

Saskatoon, Sask., August 22—Spread extensively in railway yards.

Thus well over 40 stations are at hand for a weed until recently unsuspected in our midst; and without doubt, this can be multiplied all over the country, unless possibly in Alberta and British Columbia, which received fairly intensive surveys in the principal agricultural belts in 1930, 1931 and 1933, without its discovery.

For the benefit of any who might have an opportunity to look for it, an excellent description, as given by Dr. Robinson in his paper in *Rhodora,* may be here quoted.—"Annual, erect or ascending, 2-4 dm. high, with habit somewhat as in *Sisymbrium altissimum;* stem retrorsely pubescent, the hairs being simple; leaves oblong in general outline, deeply pinnatifid to decidedly bipinnatifid, the lobes rounded, the sinuses broad and usually obtuse or truncate; racemes at length elongated, loose, the pedicels slender, ascending or so widely spreading as to be nearly horizontal, in fruit 6-10 mm. long, the lower ones subtended by distinct (though much reduced) leaves or leaflike bracts; flowers of medium size; petals pale yellow 5 mm. in length; pods linear, subterete, 2.5-3.5 mm. long, 1-2 mm. in thickness, tipped with a slender style about 3 mm. long; seed essentially in a single row in each cell."

The continuance of leaves or leaflike bracts up into the inflorescence, is an unusual thing in the *Cruciferae,* so that their presence here is useful as a field character for identification Other aspects of the plant also soon impress themselves strongly upon one who has seen it a few times, and this in spite of the fact that from seedling to well developed maturity, it may exhibit every degree of branchiness.

Dog mustard is adventive from Europe, where it is a recognized weed. In this country it is usually found along railways or waysides, but is not confined to such a habitat. In several places it was seen as a crop weed, and in the Ste. Rose district of Manitoba is regarded as a dangerous pest.

NOTES ON THE NESTING OF THE DUCK HAWK IN ONTARIO

By ROBERT VINCE LINDSAY

OF THE REMNANT of hawks to be found in the north-eastern United States and Canada, the Duck Hawk, (*Falco peregrinus anatum*) is probably the most interesting and spectacular.

It is very doubtful if this species ever occurred in eastern Canada in numbers sufficiently great to justify the term "common" being applied to it, the difficulty in finding suitable nesting sites undoubtedly having been an important factor in limiting its numbers. Like its Old World counterpart of mediaeval fame (the peregrine falcon) the Duck Hawk has consistently shown a decided preference for rugged surroundings remote from civilization in which to rear its young. It almost invariably selects high rocky cliffs overlooking lake or stream (with a requisite water-fowl population) for its daily needs[1].

The persistent advance of civilization in the New World, and, within recent years, the highly efficient weapons of destruction perfected by man, have been largely responsible in reducing many of our more conspicuous forms of bird-life to dangerously near the vanishing point, and one can readily appreciate the conservationist's attitude of alarm as to the future welfare of this and other illustrious birds of prey.

The future increase of the Duck Hawk in Ontario appears to be improbable, and its status at present, if the literature on the subject is to be our criterion, shows it to be so rare that very few eyries have been discovered.

Possibly the first Ontario breeding record is that of J. E. Cabot, who saw an unfledged young in the summer of 1848, at St. Ignace Island, Nipigon Bay, Ontario.[2]

In 1898 P. A. Traverner found a set of eggs in an eyrie located on the side of a cliff 75 feet above water at Crown Island, Lake Muskoka[3]; and W. G. Shelbourne collected a set of eggs from an eyrie in the Blue Mountains, Leeds County in 1900, and in 1901 eggs were again collected; a set of two eggs was found on May 8, 1902, and in 1903 another set of four eggs. This nest was visited several times by the late Edwin Beaupré[4]. J. W. Russell describes an eyrie with three downy young found on a ledge of a high cliff at Dorset, Lake of Bays, Muskoka, in June, 1906. They nested again in 1907, the young hatching on May 20[5]; M. Y. Williams reports adults and young seen on July 10, 1915 at Echo Island, top of Bruce Peninsula[6]; Edwin Beaupré found one pair breeding near Kingston (Crow Lake), eggs or young having been seen

in the nest in 1917, 1918, and 1931[7]; Messrs. W. E. Saunders and T. D. Patterson report (not published) the finding of an eyrie at Bass Lake, Algonquin Park; Rev. C. J. Young, states "This species breeds at Diamond Lake, North Hastings County[8].

In addition to the above records, the writer, and Mr. F. H. Emery of Toronto were instrumental in bringing to light a previously unknown breeding locality (the ninth) for the Duck Hawk in the Province, while on a tour of investigation near Redwing, Grey County, on June 6, 1929. The residents of this district promptly apprised us of the presence of what they described as a vicious pair of "eagles" inhabiting the neighbourhood of a limestone cliff on the property of the late Mr. Metcalfe, an old resident of the district whose farm lies half a mile southwest of Redwing.

This limestone escarpment faced west and appeared to be roughly one hundred feet high, with a sheer drop of eighty feet at the highest point. A quarter of a mile to the west flowed a small trout stream, and eight miles away in the same direction lay the Beaver River (which empties into Georgian Bay fourteen miles northeast of the escarpment). This is an interesting feature as the literature suggests that Duck Hawk eyries are usually located in the immediate vicinity of water.

Without losing further time we hastily made our way toward the cliff. However, instead of encountering rapacious "eagles" we were greeted with the loud, high-pitched, penetrating *keh keh keh keh* cries of a pair of Duck Hawks as the birds executed their aerial manoeuvres high above the cliff. This indeed was an illuminating discovery, but the real difficulty was to locate the postulated eyrie. The intricate problem was finally solved after much laborious effort was expended with negligible results. We chose a strategic position which favoured us with an unobstructed view of the cliff, and noted subsequent proceedings. The female (distinguished by her larger size) finally exhibited proper parental concern for her offspring by swooping from a considerable height at an astonishing speed, and disappearing almost as quickly into what appeared to be a very small cavity about a third of the distance from the apex of the cliff. Training our binoculars on this spot we saw a white object, which was certainly not a part of the cliff, shift its position slightly. Immediately above, and so on the brink of the precipice stood a clump of four stunted paper birch trees.

Making a mental note of this we speedily obtained stout ropes and after much time and effort fastened these securely to the trunks of the birches, and then threw the end, which had been knotted, overboard. While Mr. Emery manipulated the ropes and kept a watchful eye on hawk proceedings the writer made a nervous descent to the eyrie, which proved to be no mere pigeon-hole in the rock as judged from below but a good sized cavity of spacious dimensions, having a penetration of fifty-six inches, an average height of fifty-two inches, and width of thirty-six inches. The interior was inappropriately bedecked with ferns of the bulblet bladder and purple-stemmed cliff brake varieties. The floor of the eyrie was scantily covered with an assortment of feathers, bleached bones of wild birds, and domestic fowl. A few pullet legs of recent kills added a finishing touch of colour to the falcon's retreat. It should be stated that no sticks or nesting material of any kind were in evidence, although Forbush (*loc. cit.*) mentions that Audubon found nests of sticks and moss on Labrador and Newfoundland cliffs.

Meanwhile, three downy young about the size of bantam fowl united their voices in a tirade of protest of ear-splitting intensity, while the agitated cries of the excited parents seemed only to stimulate their vocal efforts. Grasping one of the youngsters in a friendly gesture of good-will, (but motivated it must be confessed by a subtle desire for possession), resulted in quickly dispelling any illusions which the potential collector may have entertained of establishing amicable relationships. Beak and talons were freely used during the ensuing melee before the obstreperous one was subdued sufficiently to permit its being placed in a basket and whisked aloft for safe keeping. During the height of the fracas the parent birds remained at a respectful distance from the scene of disturbance, only on one or two occasions swooping down to within thirty feet or so of the eyrie. This behaviour on their part is somewhat at variance with the numerous accounts cited in a certain class of literature concerning the reckless ferocity of raptorial birds in defence of their young. It was interesting to note also in this connection that the adult male appeared even less aggressive than his audacious mate, and could usually be seen flying high above the female or at a convenient distance away. The voice of the male was of a gentler tone and possessed a plain-

tive quality in contrast to the shrill *keh keh keh* of the female.

To watch these birds in flight is to witness one of the most marvellous exhibitions of speed and command of the air shown by any bird. Their sudden arrow-like fall from a dizzy height is indeed an impressive sight.

In an interview with the late Mr. Metcalfe we learned that the falcons, or "eagles" as he called them, had nested there regularly every season for the past forty years without molestation, although he affirmed the farmers living in the immediate vicinity usually lost about half of their poultry stock every summer, consisting mainly of chicks, pullets, and ducklings. So swift were these birds, however, in making off with the fowl that it was extremely difficult to catch them in the act. Mr. Mitchell, owner of an old saw mill a quarter of a mile west of the cliff informed us that in 1929 up to June 6, they had lost fifty young ducks. We were thereupon urgently requested to wipe out the total "eagle" population of the district, a distasteful proposition which we diplomatically evaded.

A second expendition to the haunts of the Duck Hawk was undertaken on May 31, 1930. Our party on this trip included Messrs. F. H. Emery, H. H. Brown, A. Van, (photographer) and the writer. As we drew near the cliff the alert birds welcomed us by a menacing outburst of *keh keh keh*. Adopting our former tactics of descending the cliff via the knotted rope to the eyrie, this proved somewhat less exciting than did the initial adventure of the previous year. As before, only three downy young occupied the eyrie, plus one addled egg which had, for some reason or other, escaped damage. The egg, short ovate in shape, was creamy white, heavily marked with cinnamon brown. The measurements were 62.25 × 44 mm. A liberal amount of bones, feathers, and poultry remains was again in evidence, as ocular proof that the available food supply for this voracious family still held good. Extricating a petulant young falcon from among his fellows, including the aforementioned egg and a miscellaneous collection of bones, legs, feathers, etc., for later identification, the human biped scrambled in simian style to a place of security where an atmosphere of peace and tranquillity prevailed. During the intervening period our photographer succeeded in obtaining some very good pictures of proceedings.

Later we were entertained with harrowing accounts of "eagle" depredations by irate human neighbours whose domestic flocks had been decimated by the predatory ones. Graciously assuming a sympathetic mien, but secretly hoping that the falcons would continue to occupy their well-nigh impregnable home for generations to come, we took our departure.

An attempt was made by Mr. Emery to rear the young falcon which we had taken. In this experiment he was successful for a time but the bird unfortunately developed paralysis in the legs and passed out on July 19, 1930. The specimen proved to be a male, and is now in the writer's collection.

On our third expedition to the Duck Hawk country on May 31, 1931, we experienced inclement weather which seriously hampered our attempts at photographing the young in the eyrie, of which there were, as before, three. We were successful, however, in securing an addled egg plus an assortment of feathers and bones. The parent birds evinced their usual reluctance in venturing too near as we inspected their sanctum, but amazed us with an extraordinary display of power and command of the air never before witnessed by us. In the face of a stiff wind, these paragons of the art of flight, would hang as it were suspended in space, and without any apparent stroke of pinions maintain their position for minutes at a time.

The collection of bones, feathers, etc. (not including poultry remains) was submitted to Mr. L. L. Snyder of the Royal Ontario Museum of Zoology for proper identification. I should like here to express my sincere appreciation to Mr. Snyder for the time and trouble given to this task, and for many other courtesies shown in the past. The submitted report reads as follows:— Twenty tarsi, and many feathers of killdeer plover; two tarsi of blue jay; remains of two meadowlarks (feathers); few wing feathers of goldfinch; bones and feathers of nighthawk; one pigeon (feathers) and many additional bones and feathers, probably of the above mentioned species; one small wasp; wing case of a brown beetle; a little gravel, and a small quantity of wheat; (the last two items probably from the crops of poultry).

Notwithstanding the apparent economically harmful nature of the Duck Hawk's daily menu, we can only plead on the grounds of fairness and justice that the Duck Hawk is a sufficiently rare species to deserve the most stringent protection, and surely we can sacrifice a few insectivorous birds, representative of species of wide distribu-

tion, and of vast numbers, to ensure the continued safety and perpetuation of a species thought by many to be the most perfect flying organism, and one of the swiftest, most nicely balanced and beautifully coloured birds in existence.

FOOTNOTE REFERENCES

[1] Forbush, *Birds of Massachusetts*, 2:165. Mention is made of this species occasionally occupying tree cavities for nesting and also deserted eagle's nests.

[2] Agassiz *Lake Superior, Its physical character, vegetation and animals*, 185[illegible].

[3] Fleming, *Auk*, 1901, and Swales and Taverner, *Wilson Bulletin*, 1906, pp. 64-5.

[4] Clarke *Ottawa Naturalist*, 1902, p. 88; Macoun, *Catalogue of Canadian Birds*, 1903, p. 254, and Beaupre, *Can. Field-Naturalist*, 1922, p. 33.

[5] Russel, *Ontario Natural Science Bulletin*, 1907, page 37.

[6] Williams, *Ottawa Naturalist*, 1915, p. 90.

[7] Beaupre, *Canadian Field-Naturalist*, 1922, p. 35.

[8] Macoun, *Catalogue of Canadian Birds*. 1909, pp. 278-9.

BIRDS AND A BATH

By SUSAN K. SQUIRES

ALMOST everyone has seen birds taking a bath. They are interesting, sometimes amusing, and always well worth watching. We have a water tub in the barnyard into which the surplus spring water from the house flows. At one side where the tub overflows is a cement block with a hollow in it not much larger than a soup plate into which a continual dribble of water runs. Here the chickens and pigeons drink and the smaller birds bathe. I have even found a fat old toad in it at dusk soaking the moisture into his spotted warty hide. On hot days in July and August it has a great many visitors and it is amusing to watch the different ways different species approach the water. Of course the most of the birds stand in the water and splash and let the dribble run over them, robins, thrushes, sparrows and others, but some do not. The wood peewee alights on the edge of the tub and drinks, the red-eyed vireo splashes right at the surface of the water and throws it all over his back, and the swallows barely touch the water as they glide over. While the birds wait they have many rows as to precedence but usually the biggest bully gets the first chance.

But some birds have more uncommon ways of bathing. Early one morning after a thunderstorm I stood on the lawn with my bird glasses in my hand. There must have been a gentle rain after the thunderstorm for the leaves were not beaten down but stood up stiffly and each leaf was loaded with large individual drops of water. As I stood, something whirred past my head and flew towards the corner of the veranda which is covered with a wild grape vine. It was a male ruby-throated humming-bird and I thought he was going to alight but he did not. He poised on his almost invisible wings as close to the leaves as he could get without his wings touching and began to spray his body with the large drops. As those on one leaf were exhausted he flew to another and then another until he was satisfied with his bath, then he flew to a cherry tree, lit and finished his toilet.

A male pileated woodpecker performed his ablutions in a lazier manner. It was a rainy Sunday morning and he was in a butternut tree twenty-five or thirty feet in front of the house. The rain that was falling was the kind of Scotch mist which wets an Irishman and everyone else to the skin. It was summer and warm so perhaps the woodpecker enjoyed the wetting for he made no effort to seek cover. He was so soaked that he seemed all neck. Occasionally he would run his bill down through his feathers as if opening up new channels for the water to run in. After a while he began to stretch his wings and to go over the feathers one by one with his bill.

Another morning I watched a crow taking a bath but it was in a snow drift. It was towards the last of April and the fields were nearly bare, except where there had been deep drifts and these had melted until they were composed of tiny pellets of ice like hail and were very wet. The crow was stalking around over the bare ground hunting for something edible when an idea struck him. He walked sedately over to one of the mounds of snow, sat down and began to dig a hole with his feet, throwing the wet icy snow up around him. After the hole was deep enough he turned to one side, spread the top wing to its fullest extent and began to throw the snow all over his body with his feet just as a hen does in a dust bath. He would also rub his head and neck on the snow at the edge of his "nest." After a time he got up and reversed his position turning the other side of his body up and repeating the performance. When he

was sure he was clean he stood up, shook himself thoroughly, and flew up into a nearby elm tree to dry in the sun.

We scarcely stop to ask ourselves if winter birds ever have a bath, although of course we see house sparrows taking advantage of a winter rain to slop in the puddles on the side-walk. I saw the question, "Did anyone ever see a chickadee take a bath?" asked in print somewhere. I did once. Where our spring comes up out of the ground it is surrounded by a circular cement tank. After a wet autumn, despite the water which is piped to the house, it overflows and forms a little brook cutting down through the banks of snow and keeping the ground thawed. In this little brook and close to the spring I saw some sort of a commotion going on one morning and it proved to be a bird in the water. I suppose it was the flash of the drops of water in the sun which drew my attention for I could not really see the brook because of the snow on each side. Each time the bird flew up in the air and splashed down I could see head or wings and see the water thrown. The spring water was not too icy and the little bird was evidently enjoying itself all alone. It was not until it flew up on the five-fingered ivy, which covers the rustic summer house over the spring, to preen its feathers, that I saw that the bird was a chickadee.

Another day I saw ten or a dozen pine grosbeaks having a bath in the same little brook. It goes under the avenue which leads to the highway, in a culvert made with boulder sides and covered with huge flat stones. As the brook drops away from the bridge it spreads out over a space five or six feet wide where daffodils and narcissi grow in the shallow water. I was standing looking at the sprouting bulbs, for although it was the last of March and the fields were still covered with snow, the spring water had started the bulbs growing. While I watched, the pine grosbeaks, which had been feeding on maple buds in the tree overhead all dropped down into the water splashing and whistling and I went on and left them having the time of their lives.

I have also watched a flock of goldfinches bathe in the middle of winter but it was in light feathery snow. I saw the flock of small birds at the cones of a yellow birch tree but although I thought they were goldfinches I was not quite sure, for siskins are much more common with us in winter, and this was February. I snowshoed very quietly through the soft snow to get near enough to them to be sure. Close to the birch was a stunted hemlock whose lower branches were very wide and far-outreaching and on each branch was a miniature snowdrift of very fluffy dry snow which had fallen the previous night. Just as I satisfied myself that the birds were goldfinches, they began to drop into the snowdrifts on the hemlock. The snow was so dry that they could throw it all about as they fluttered their wings up and down. When they had finished they flew back into the birch again and resumed their interrupted task of dissecting the cones.

SOME NOTES ON THE WINTER BIRDS OF YARMOUTH AND THE TUSKET ISLANDS OF NOVA SCOTIA

By R. A. JOHNSON

IN SEARCH of an opportunity to observe the Atlantic Murre in winter I made a visit to Yarmouth and the Tusket Islands of southwestern Nova Scotia during the latter part of December, 1932. December 24th and 25th were spent about the harbour at Yarmouth with a four mile trip along the coast in the vicinity of Chebogue Point. The succeeding six days were spent on and about Spectacle Island, which is approximately fourteen miles from the mainland—one of the outer of the Tusket group. Particular attention was given to the study of the sea birds, yet, whenever land forms were encountered note was made of them.

During the eight days temperature ranged from 29 to 44 degrees Fahrenheit, but was above freezing point most of the time. There was very little wind so that many of the sea birds which ordinarily live well off shore were rarely seen and doubtless some that were there and might be blown in during a storm were not recorded by me. The temperature of the water at Spectacle Island ranged from 40 to 42 degrees.

A special fishing season for lobster was open in Nova Scotia during the winter, consequently there was a population of several families of fishermen on Spectacle Island. Most of these

people were interested in my work and helped me in any way they could. Besides the kindness and hospitality which they extended to me, they were always watching for birds which they reported to me at the end of each fishing trip. Sometimes I traveled along in one of the boats and thus made records of birds that were not seen near the islands.

Observations on the feeding habits of certain species with notes on the hunting methods used in the region are presented in conjunction with those pertaining to the abundance of the species. The list of species which follows cannot be considered complete, for during my short visit some of the rarer forms would certainly escape notice. A species of sparrow which seemed to be a resident was not identified. Grouse were reported on the wooded islands which also support great number of mice and likely different birds of prey.

Gavia immer. COMMON LOON.—This loon was very common. It was often seen on the water and flying in the region of Spectacle Island.

Fulmarus glacialis. ATLANTIC FULMAR.—Individuals were seen at different times about Spectacle Island.

Moris bassana. GANNET.—This bird was reported to me several times by the fishermen but it was not observed by me.

Phalacrocorax sp. CORMORANT.—This bird was reported to me and was said to be common. I did not observe it.

Branta canadensis. CANADA GOOSE. — Canada geese were frequent visitors to the region of the Tusket Islands, but the total number of birds was small. I believe that there were not more than two or three small flocks coming into the region and they were very wild.

Branta bernicla. AMERICAN BRANT.—Three birds of this species were reported, but not seen by me. The species is said to be comparatively rare in the region.

Anas rubripes. BLACK DUCK. — Large flocks containing two to five hundred birds were seen daily among the Tusket Islands. During the day these birds were in the vicinity of the outer reefs. In the late evening and early morning they seemed to go in among the islands and to the mainland for drinking and likely for food also. At such times comparatively small flocks were encountered. The native people believe that there are two varieties of black duck in the region; one, a large red-legged bird which they refer to as an "outside" bird, and another, a smaller duck with orange and grey coloured legs which they call an "inside" duck. The method of hunting the black duck is, for the most part, by shooting from a blind at places where the birds come for fresh drinking water. Two birds examined by me were in good flesh. They weighed 1276 and 1075 grams respectively.

Glaucionetta clangula. GOLDEN-EYE.—A flock of thirty of these ducks was feeding in the inlet to the Yarmouth harbour on December 24th, and again on the 25th. Other small flocks were seen among the Tusket Islands. One specimen examined by me was of the species *americana.*

Clangula hyemalis. OLD SQUAW. — The Old Squaw was one of the most numerous of birds found around the Tusket Islands. Flocks of four to twenty birds were put up every few minutes as one travelled in a boat among the islands. Due to the many boats which were going about fishing for lobster the birds were wild, restless and flying a great deal. They seemed to feed chiefly between the hours of nine in the morning and three in the afternoon, according to the condition of the tide. I spent several hours watching their habits on one favoured feeding shoal, a shallow water bar which formed a connection between the two parts of Spectacle Island at low tide. The birds seemed to be feeding exclusively on the abundance of small snails, and possibly taking also some of the coarse sand available there. When the tide was well up over the bar a small flock of birds would alight there and soon be followed by others in singles or in small flocks until twenty or thirty birds might be present. After all had inspected the landscape thoroughly to detect any enemy, meanwhile swimming toward a compact group, one bird would dive and be immediately followed by all the others. For a period of from ½ to 1½ minutes all the birds would be down below the surface of the water. When the birds came up they might be scattered several yards or rods apart, whereupon they would swim back toward a concentration point before another dive would be made. Additional birds might join the feeding flock at any time, some birds leave it, or the entire flock fly round in wide circles a few times before resuming the feeding. At times the birds become playful and, at the same time, noisy. Some will flap about on the water in a short semicircle at which time their peculiar notes can be heard at a great distance; a noise which sounds to one who is not familiar with the bird somewhat like that of a flock of geese.

This habit, which the species has, whereby

the entire flock dives under water at the same time is a serious menace to it when considered in relationship to man. The hunter is enabled to run up on a flock which may be feeding within gun range of the shore. When the birds are up the hunter lies motionless on the ground and when they again dive he approaches closer. Thus he can usually make a good account of his effort, for sooner or later a bird will dive and come up close enough to shore for a good shot. Then the other birds can be depended upon to circle back once or twice and hesitate over the dead bird which may permit of another kill.

Somateria mollissima. EIDER.—Eiders were often seen in small flocks of four to ten birds flying in a line as they went about among the islands; but the total population was not very great. Two birds were found dead; both, I think resulting from shot injury.

An interesting method of hunting the Eider, which is also sometimes used with the Old Squaw, may be described here. At times a duck will consume a quantity of small snails together with sand so that an accumulation of this heavy material fills up the neck and throat in such a manner that the bird looses its balance and cannot fly for a time. Such a bird is called a "bedded duck", and is immediately pursued with a boat in which the gunner follows the diving bird persistently until it becomes so tired that it must finally appear on the surface at very close range. It is then shot with little likelihood of wasted ammunition.

Melanitta deglandi. SCOTER.—This bird was found to be comparatively rare among the Tusket Islands. One specimen, a young male was taken. It was in good condition.

Larus marinus. GREAT BLACK-BACKED GULL.—I believe there were six birds staying around Yarmouth harbour.

Larus argentatus. HERRING GULL. — This bird was very common around Yarmouth and often seen among the islands.

Larus delawarensis. RING-BILLED GULL.—The species was noted among Herring Gulls around Yarmouth.

Rissa tridactyla. ATLANTIC KITTIWAKE.—One immature bird was collected. The native fishermen know this bird as the "Fall Gull". They say that it is very common in the fall but becomes uncommon in late winter.

Alca torda. RAZOR-BILLED AUK.—One bird of this species was seen at close range near Spectacle Island. I believe that it frequently occurs in the vicinity as the fishermen know it well, and refer to it as a "noddy".

Uria lomvia. BRUNNICH'S MURRE.—One specimen of this species was collected in the waters outside Spectacle Island. I believe this species spends most of its time well outside the waters which surround the islands.

Alle alle. DOVEKIE.—Everywhere along the coast of the mainland and also on the islands were to be found wings and parts of the carcasses of the Dovekie. During the four mile walk along the shore of the mainland at Chebogue Point I examined the remains of six of these little birds. The flesh had all been consumed by crows and gulls. The native fishermen on Spectacle Island spoke of a migration of great numbers of these birds about December 1st. They stated that many of the birds could not, or would not, fly when approached, and so could be picked up or knocked over with an oar. At the time of my visit to the island there were only a few individuals to be seen. One specimen collected was in good condition, weighing 127 grams.

Cepphus grylle. BLACK GUILLEMOT.—One specimen was taken in the waters outside Spectacle Island. It was very fat, weighing 470 grams.

Fratercula arctica. ATLANTIC PUFFIN.—This species was not observed, but I discovered the head of a freshly killed specimen. I do not think that it is very common about the islands. It may be that there are greater numbers farther out to sea.

Cryptoglaux acadica. COMMON SAW-WHET OWL. —One specimen of this owl was taken on the wooded end of Spectacle Island and two others were seen.

Colaptes auratus. FLICKER.—Two of these birds were seen together on the mainland about two and one half miles east of Yarmouth.

Corvus corax. NORTHERN RAVEN.—Two Northern Ravens were living in the vicinity of Spectacle Island.

Corvus brachyrhynchos. EASTERN CROW. — Everywhere on the mainland, and on the islands, crows were to be found in large numbers; it was a common thing to see thirty to fifty birds in a flock.

Penthestes atricapillus. BLACK-CAPPED CHICKADEE.—This species was fairly common around the conifers, both on the mainland and on the islands.

Penthestes hudsonicus. ACADIAN CHICKADEE.— This bird was found in the dense growth of low fir trees growing on Spectacle Island.

As stated before, the main purpose of this trip to southern Nova Scotia was to search for the Atlantic Murre. No birds of this species were found. However, several of the men on Spectacle Island assured me that, from the description I gave them, they knew the bird well, and that it would be blown in when a good storm came. Consequently on January 15, after a severe storm, I had a letter from them saying that many "scribes" (local name) had been seen. The question of accepting this as a record comes when one considers the close resemblance between the two species of Murre which may be found in this locality and that sometimes ornithologists do not detect their distinguishing characters.

STATEMENT OF FINANCIAL STANDING, OTTAWA FIELD-NATURALISTS' CLUB, AT THE CLOSE OF THE YEAR, 1932-1933

ASSETS	
Balance in Bank, Nov. 30, 1933	$ 4.27
Bills receivable	44.56
	$ 48.83

LIABILITIES	
NIL—	
Balance	$48.83
	$48.83

RECEIPTS	
Balance, November 26, 1932	.88
Fees—Current	905.83
" —Advance	58.05
Advertisements	15.00
Single numbers	169.05
Separates and Illustrations	62.58
Miscellaneous	30.88
	$1242.27

DISBURSEMENTS	
Printing and mailing "Naturalist"	$998.98
Editor	90.00
Postage and Stationery	40.11
Separates and Illustrations	72.11
Bank discount	18 19
Miscellaneous	18.61
Balance in bank November 30, 1933	4.27
	$1242.27

WILMOT LLOYD, Treasurer.

Audited and found correct:
December 4, 1933.

A. G. KINGSTON,
HARRISON F. LEWIS,
Auditors.

*Explanatory statement by the Treasurer:—

During the year Nov. 26, 1932—Nov. 30, 1933, the total receipts of the Club were $1242.27. For the same period the expenditure for publishing *The Naturalist* was $1219.39. The receipts from membership fees amounted to $963.88

It took the total membership fees plus the amount of $255. 51 to issue *The Naturalist*. Attention is called to the fact that this last mentioned sum was almost entirely a contribution to the present membership at large from resources accumulated by the Ottawa Field-Naturalists' Club when it was only a local society, and before the Club undertook, fifteen years ago, the national work of affording a place of publication for Canadian natural history.

WILMOT LLOYD.

STATEMENT—RESERVE FUND

ASSETS	
Canadian Government Bonds	$1200.00
Cash in Bank	71.74
	$1271.74

LIABILITIES	
NIL—	
Balance	1271.74
	$1271.74

RECEIPTS	
Balance in Bank November 26, 1932.	5.89
Bank Interest	1.85
Bond Interest	64.00
	$71.74

DISBURSEMENTS	
NIL—	
Balance in bank November 30, 1933.	71.74
	$71.74

WILMOT LLOYD, Treasurer.
ARTHUR GIBSON
Reserve Fund Committee

Audited and found correct:
December 4, 1933.

A. G. KINGSTON,
HARRISON F. LEWIS.
Auditors.

STATEMENT—PUBLICATION FUND

ASSETS	
Canadian Government Bonds	800.00
Cash in Bank November 30, 1933	51.35
	$851.35

LIABILITIES	
NIL—	
Balance	851.35
	$851.35

RECEIPTS	
Life membership fees	350.00
Bond Interest	35.75
Bank Interest	9.69
	$395.44

DISBURSEMENTS	
Purchase of $300 face value Canadian Government Bonds	299.14
"Naturalist"	44.95
Cash in Bank November 30, 1933	51.35
	$395.44

WILMOT LLOYD, Treasurer.

Audited and found correct:
December 4, 1933
A. G. KINGSTON,
HARRISON F. LEWIS,
Auditors.

55TH ANNUAL MEETING, OTTAWA FIELD-NATURALISTS' CLUB; COUNCIL REPORT

1. MEETINGS. Since the last annual meeting three Council meetings have been held: at the homes of the following members—Mr. E. F. G. White, Dr. E. M. Kindle and Mr. C. M. Sternberg, President. The attendance averged 12.

2. LECTURES. No lectures were given during the year.

3. BIRD CENSUS. The annual Bird Census was carried out as usual in connection with other societies in the United States and Canada. The local Bird Census, arranged by Dr. H. F. Lewis, was held on December 26th, 1932, 16 members going out in 9 parties. 2,108 individuals were counted and 26 species identified, the largest number of species to be counted in any Christmas Bird Census at Ottawa; notwithstanding the absence of some of the species usually seen.

4. EXCURSIONS. This year there were more excursions arranged for than in some other years, and these of exceptional interest. An early one in March, when the Club were guests of Dr. E. S. Archibald at the Central Experimental Farm, and visited the Dairy and inspected young livestock under the leadership of Mr. George Muir, was followed in May and in June by 8 more. Of the 4 planned for September only 2 were held. The attendance in May averaged 30, in June 13 and in September 5. The programme for the excursions included visits to the following districts and partook of the subjects indicated: McKay Lake, ornithology, led by Mr. Hoyes Lloyd; Ottawa River at Hintonburg, ornithology, led Dr. H. F. Lewis; Fairy Lake, zoology, botany, ornithology, led by Mr. C. E. Johnson, Dr. R. E. DeLury and Mr. Hoyes Lloyd, Britannia, zoology, led by Dr. R. M. Anderson; Carlsbad Springs, geology and zoology, led by Messrs. A. LaRocque and C. E. Johnson; Dominion Experimental Farm, ornithology, led by Mr. W. H. Lanceley; Jones Falls, geology, botany, entomology, led by Messrs. Arthur Crowson and J. P. Henderson. The autumn excursions were to Hog's Back, geology, led by Mr. C. M. Sternberg; and Long Lake, botany and geology, led by Mr. F. J. Fraser. A full account of this excursion was printed in the October *Naturalist*.

5. COUNCIL REPRESENTATIVES TO ROYAL SOCIETY OF CANADA MEETINGS. Dr. E. M. Kindle was asked by the President to represent the Club at the Royal Society of Canada meetings held at Queen's University, Kingston, in May.

6. INTERNATIONAL COMMITTEE FOR THE PROTECTION OF THE BIRDS OF THE WORLD. Mr. Lloyd and Dr. Lewis have been the Canadian representatives of the International Committee for the Protection of the Birds of the World during the year.

7. FEDERATION OF ONTARIO NATURALISTS. Dr. H. F. Lewis represented the Club at the meeting

at Queen's University of the Federation of Ontario Naturalists on the King's birthday.

8. PUBLICATIONS. Mr. Hoyes Lloyd, Chairman of this Committee reported that *The Canadian Field-Naturalist* had been issued on schedule time throughout the year with a reduced number of pages. The Committee had sold a complete set of the Club's publications to the Province of Quebec for the use of the Zoological Society. This Committee has also prepared biographical articles on the lives of the late Norman Criddle, the late W. T. Macoun and the late M. O. Malte—three highly esteemed naturalists and valued members of Council—for publication in *The Canadian Field-Naturalist*.

9. FINANCE. As a result of the saving made by issuing the *Naturalist* with a reduced number of pages, the Club has been enabled to reach the close of the year with no apparent deficit.

10. INFORMATION SERVICE. The Information Service, of which Mr. A. LaRoque has been Chairman, has announced, through the columns of the Naturalist, the availability to amateurs of the resources at the command of the members of the Club.

11. DR. H. M. AMI SCRAP-BOOK — 1899, 1900, 1901. During the year this scrap-book was placed in the Public Archives of Canada, where the Dominion Archivist promised to have it put in a glass case, for consulation by students.

12. FLETCHER MEMORIAL FOUNTAIN. The Club drew to the attention of the Minister of Agriculture the fact that the inscription on this fountain at the Central Experimental Farm was growing dim. The Minister agreed not only to have the inscription cleaned, but to have the Fountain again put in working order.

13. SPECIAL COMMITTEE. The Special Financial Committee, of which Mr. Hoyes Lloyd is Convenor, has had an active year in advertising the merits of the Club.

14. COUNCIL. Your Council in retiring from office, desires to express its appreciation of the work done by members in the field of natural history generally, as well as in co-operation with Council; also to express its faith in a brighter future, as can be hoped for from our financial statement. To the incoming Council and Executive we turn over the task of administration with every hope for successful promotion of an enterprise now about to begin the 56th year of its history.

C. M. STERNBERG. GRACE S. LEWIS.
President *Secretary*

NOTES AND OBSERVATIONS

THE MADEIRA PETREL, *Oceanodroma castro*—A NEW BIRD FOR CANADA.[1]—The latter part of August, 1933, was notable for the terrific storm that swept the Atlantic and did incalculable damage along the eastern coast of the United States. This storm seemed to have originated in the eastern Atlantic in the neighbourhood of Madeira and the Azores and, sweeping westward, spent its force against the shores of this continent. Undoubtedly great numbers of pelagic birds were blown far from their normal ranges by the tempest. Reports have come in of various strange Petrels and Shearwaters found far inland in the days shortly after the occurrence and the list of North American birds has probably been increased by the first occurrence of several of these waifs.

Of course there is not the slightest chance of such deep sea species surviving inland or on fresh water. They are truly pelagic in habit and habitat and their home is the vast expanse of the salt seas. How often these disasters take place it were hard to tell. Every once in a while some lone wanderer turns up far from its native habitat but the few that come to the attention of ornithology must be only an infinitesimal fraction of those that are blown to hostile surroundings and drop on weary wing to oblivion without informed observers being the wiser.

It was probably this storm that added at least one species to the Canadian list,—a Madeira Petrel, *Oceanodroma castro,* which was picked up living but helpless on the Rideau River within the city limits of Ottawa, on August 28th. The bird died in the night and was brought by some intelligent boys to the National Museum, where it now reposes. The boys thought that they had seen several similar birds fluttering about the river a day or so previous but though a search of the river and its shores was made immediately, no such birds could be found and no definite confirmatory evidence obtained.

The Madeira Petrel breeds on Madeira, the Salvages, Azores and Cape Verde Islands and is

[1] Published with the permission of the Director, National Museum of Canada Department of Mines, Ottawa.

usually confined to the eastern and southern Atlantic. There are casual individual records for the species in Pennsylvania, Indiana and the District of Columbia, all probably victims of similar meteorological disturbances. This specimen thus makes the fourth record of the species for North America and the first for Canada.—P. A. TAVERNER.

Microtus tetramerus ON VANCOUVER ISLAND, B.C.—During the summer of 1931 several interesting colonies of *Microtus tetramerus* were found on the west coast of Vancouver Island. Three of these were of particular interest.

The first colony was situated in a grassy glade on the outer reef off Chesterman Beach near Tofino. This reef is a rugged mass of rock about half a mile in length, and the width varying from a few feet to a couple of hundred yards. Clumps of spruce and other trees and bushes grow here and there and patches of grass and fern are in evidence where sufficient soil enables them to gain a foothold. The reef is entirely separated from the main island except for a sand bar half a mile in width which is bare only at low tide. These voles had chosen a sheltered situation in a thick growth of grass and hay amongst rocks and stunted spruce. Here and there were many runways diverging in every direction and while setting out the traps a young vole ran into one of these and was captured.

The following day, May 19th, the traps produced six voles, three adult females, two adult males and one juvenile female. On May 20th two more were taken as well as two *peromyscus*.

The other two colonies were on two small islands southwest of Meares Island. The larger of the two islands lies about a quarter of a mile from Meares Island, is very rocky and about an eighth of an acre in extent. On it is a considerable growth of salal and stunted cedar and fir. A soft grass covers a large portion of the southerly end of the rock and in this grass are numerous deep, well worn runways running in every direction. This grass is apparently the mainstay of these voles and cuttings were everywhere in evidence.

At very low tide this small island can be reached from Knocken Island over a mud flat and Meares Island can be reached from Knocken Island in the same manner, but only at very low tide.

Another island lies about a mile further up Disappointment Inlet and its vegetation consists of salal, small firs and various weeds and grass. A small colony of *microti* lives on this small island and the runways through the thick grass were fresh and well worn. This island is entirely separated from the surrounding islands by deep water.

A resident of Tofino stated he had seen several colonies of these mice on different isolated rocky islands and had once captured one of these voles alive.

The isolated colonies of *Microtus tetramerus* offer the curious problem as to how these small rodents originally reached these out of the way places.

The specimens taken on Chesterman Beach reef showed signs of severe fighting and in a few hours they almost completely devoured a small bird which was unfortunately caught in one of these traps.

Mink were common about here and it is strange that the small *microtus* colony was not completely exterminated. One morning when examining the traps a large mink was seen running along the rocks close by and on being secured was found to be an old male weighing four and a quarter pounds.—KENNETH RACEY.

BOOK REVIEWS

BIRDS AND MAMMALS FROM THE KOOTENAY VALLEY, SOUTHEASTERN BRITISH COLUMBIA. *By Joseph Mailliard, Curator emeritus Department of Ornithology and Mammalogy, California Academy of Science, Fourth Series, Volume* 20, *No.* 8, *January* 8, 1932. *San Francisco: Published by the Academy. pp.* 269-290. *Price* 25 *cents.*

This very interesting paper by Joseph Mailliard gives the results of field work conducted by himself and Frank Tose, chief, and Russell Hendricks, student assistant, Department of Exhibits, of the California Academy of Sciences, in the region around Creston, B.C., a few miles north of the British Columbia-Idaho International Boundary, from April 30 to June 5, 1928. Collections were made principally on the east side of the Kootenay River near Creston (altitude 1985 feet) and on benches at the foot of Purcell Range, but some collecting was done by Mr. Tose on the west side of the river at foot of Nelson Range from May 9 to 14, and at Kitchener (about 2435

feet) approximately twelve miles east of Creston, and at Yahk (2817 feet), about twenty-seven miles east of Creston, a few miles north of the British Columbia-Idaho-Montana corner. This region, in one of the comparatively dry interior valleys of British Columbia, shows considerable variety of habitats, from the broad, low, periodically overflowed bottom lands of the Kootenay Flats to the heavily timbered benches and mountain sides of the Purcell and Nelson ranges on opposite sides of the Kootenay valley. The original timber has been removed to a considerable extent by logging and fires subsequent to the building of the Crowsnest branch of the Canadian Pacific Railway, and the immediate vicinity of Creston and neighbouring valley points is occupied to some extent by orchards and market gardens. The list of specimens obtained by the party included 319 birds (of 73 species) notes being given on 81 species, and 108 small mammals (of 10 species).

Few notes have been published on the animal life of this part of British Columbia, and as a field party from the National Museum of Canada, consisting of R. M. Anderson, H. M. Laing, and E. R. S. Hall, worked in substantially the same region during the following season, at Creston (August 7-23), Goatfell, 2910 feet (August 23-30), and Meadow Creek, 3500 feet, about seven miles south of Yahk (August 31-October 3, 1929), a comparison of records may be of interest.

The interior of southern British Columbia is so much cut up by mountain ranges and valleys that mammals of different habitats and life zones may frequently be found within a few miles of each other. The bird life is less static, and while the breeding grounds of the species are fairly well marked within certain zones, there is naturally much overlapping during migration. While the field of operations of the two parties did not cover much more than thirty miles east and west and about ten miles north and south, the California party worked mainly east of the Kootenay River at foot of the Purcell Range, and the Ottawa party mainly west of the river while near Creston. Kitchener is only a few miles northwest of Goatfell, and in the Yahk region the Ottawa party worked mainly along tributaries of Meadow Creek, a tributary of the Moyie River, rising near the extreme northwestern corner of the State of Montana. In the bird line, the California party caught the spring migration and early breeding birds, while the Ottawa party came in about the time the warblers were leaving, and spent much time in the natural fall migration route of Fringillidae along the fairly open, weed and brush-grown tributaries of the Moyie valley.

Comparison of our birds lists showed that of the total number of 81 species noted by the Academy party, 78 were listed from the vicinity of Creston, and 15 at Kitchener and Yahk, although as the notes are not very complete as to the commoner species observed on the side trips, the number of species was probably larger than indicated. The National Museum party recorded a total of 116 species of birds, of which 63 species were observed near Creston, 51 near Goatfell, and 78 near Yahk. Species which might be of questionable identity were generally collected. Fifteen species of birds noted by the Academy party in 1928 and not by the Ottawa party in 1929 include the following:[1] American Merganser (C), Arctic Three-toed Woodpecker (C, K), Alaska Three-toed Woodpecker (K), Black-chinned Hummingbird (C), Rufous Hummingbird (C), Calliope Hummingbird (C), Arkansas Kingbird (C), Bobolink (C), Bullock's Oriole (C), Lazuli Bunting (C), Tree Swallow (C), Rough-winged Swallow (C), Calaveras Warbler (C), Chestnut-backed Chickadee (C), Western Bluebird (C, K, Y).

Thirty-five species of birds were noted by the National Museum party in 1929, but not included in the list of the Academy party in 1928, as follows: Pied-billed Grebe (Y), Great Blue Heron (Y), Pintail (C, Y), Green-winged Teal (C, Y), Hooded Merganser (C), Turkey Vulture (C), Eastern Goshawk (Y), Western Red-tailed Hawk (C, Y), Marsh Hawk (C, G, Y). Pigeon Hawk (Y), Sora (C), American Coot (C), Western Solitary Sandpiper (C), Greater Yellow-legs (C), Pectoral Sandpiper (Y), Gull, *Larus* sp. (C), Rocky Mountain Pygmy Owl (G, Y), Short-eared Owl (Y), Night-hawk (C, G, Y), Say's Phoebe (Y), Olive-sided Flycatcher (G, Y), Arctic Horned Lark (Y), American Magpie (Y), Northern Raven (Y), Slender-billed Nuthatch (G, Y), American Pipit (Y), Northern Water-Thrush (G, Y), Macgillivray's Warbler (G, Y), Northern Pileolated Warbler (C, G, Y), Pale Goldfinch (C), Bendire's Crossbill (C, G, Y), Western Vesper Sparrow (Y), Lincoln's Sparrow (Y), Swamp Sparrow (Y),[2] Alaska Longspur (Y).

[1] C (Creston), G (Goatfell), K (Kitchener), Y (Yahk).

[2] Second record of the Swamp Sparrow, *Melospiza georgiana* (Latham), from British Columbia, taken by H. M. Laing on American Creek, 3800 ft., north of Flatiron Mountain near Idaho-Montana-B.C. corner, Sept. 12, 1929.

Among the points of interest was the apparent lack of Marsh Hawks in 1928, while in 1929 both adults and young were very common on the Kootenay Flats, hawking for meadow mice, and frequently gorging on small young Western Spotted Frogs (*Rana pretiosa pretiosa*). Mailliard notes the Osprey as occasionally seen in 1928, and speculated on the apparent scarcity of food for this bird, but in 1929 the Osprey could be called common, heard overhead at all hours of the day, along the muddy side channels of the Kootenay River, and finding an abundant food in the Squawfish (*Ptychocheilus oregonensis*), and possibly also capturing Large-mouthed Black Bass (*Micropterus salmoides*), the latter said to have been a comparatively recent introduction into the Kootenay River in northern Idaho and now abundant in the side channels of the river in southern British Columbia. Several nests of the Osprey were seen, one of them containing two young birds as late as August 15. The hummingbirds and most of the Warblers had evidently disappeared from the Creston district before August 7. The presence or absence of both birds and mammals in certain areas was undoubtedly strongly influenced by the high water and spring floods in 1928, and conversely by the prolonged drought during the summer of 1929 driving them from the lower levels in one case, and attracting them later to the wet spots where vegetation was luxuriant and food abundant.

The Academy party collected ten species of mammals in 1928 the only species not taken by the Museum party in 1929 being the British Columbia Woodchuck (*Marmota monax petrensis*), one specimen being found dead near the mouth of Goat River near Creston, supposed to have floated down with the spring freshet. Two specimens of Wood Rat (*Neotoma cinerea occidentalis*) were listed in the report by mistake as *N. c. drummondi,* and later corrected by Mailliard (See *Canadian Field-Naturalist,* 46: 145, Sept. 1932).

The reviewer's attention was attracted by the fact that the only chipmunks taken by the Academy were referred to *Eutamias ruficaudus simulans* Howell (Coeur d'Alene Chipmunk). The Ottawa party in 1929 took 32 specimens of chipmunks in the Creston region, and these had been studied in Washington, D.C., by the writer and Mr. A. H. Howell of the Biological Survey, and 8 specimens referred to *E. r. simulans,* and 24 to *Eutamias amoenus luteiventris* (Buff-bellied Chipmunk). The *simulans* specimens were all from the foot of Nelson Range on the west side of Kootenay River near Creston, with 5 specimens of *luteiventris* from the same region; the remainder of the *luteiventris* specimens being from Goatfell and Yahk(Meadow Creek). Through the kindness of the California Academy of Sciences 21 skins and 12 skulls of the Creston chipmunks recorded by Mailliard were sent to Ottawa for study. They were carefully compared with 69 fairly typical *E. a. affinis,* two of the females and 4 *affinis* x *luteiventris* from British Columbia, 53 *luteiventris* from British Columbia and 35 from Alberta. Six males and 13 females in the Academy collection from Creston proved to be fairly typical *E. a. affinis* two of the females differ somewhat from the others and are apparent-fairly typical *E. a. affinis,* two of the females The typical *affinis* specimens have the general grayish colour of this form with little rufous tinge. The two intermediates have considerable rufous on the sides of neck and flanks, chest faintly rufous, brighter on middle of belly, fading posteriorly, the back also showing more of a pinkish tinge than in the typical specimens.

The Academy authorities were unable to give the reviewer any information as to the altitude at which the specimens were taken, or the precise locality beyond that of Creston and one specimen labelled Kitchener.

These determinations do not disprove the general opinion of mammalogists that it is illogical to find two subspecies of the same species occupying the same ground, as in an area of assumed or proved intergradation two different subspecific forms may occupy slightly different habitats or ecological niches, or live at different altitudes. The importance of recording ecological conditions at all collecting stations and approximate altitudes when collecting in mountainous districts can not be overestimated. The writer is also convinced that in a district near an area of intergradation one subspecies may predominate while on the same ground occasional specimens of the typical form of allied subspecies may also be taken and in fact are to be expected as throwbacks to the other form.

The distribution of the several forms of chipmunks in southern British Columbia is very irregular, and while the large number of geographic races of chipmunks indicate that the species are very plastic, it is hardly necessary to go back to evolutionary and environment hypotheses to account for some of the anomalies of distribution. The National Museum of Canada has spec-

imens of *luteiventris* from Trail, Rossland (6800 ft.), Elko, Fernie, Newgate, and Morrissey, as well as from Alberta and other points mentioned. We also have *affinis* from various points in the Similkameen and Okanagan valleys, Rossland (at 4000 feet), and as far east as Cranbrook and Newgate, B.C. In fact, at Newgate our collectors in 1930 found *luteiventris* to be the form on the east side of the Kootenay River (Tobacco Plains), and *affinis* occupying the west side of the river at the foot of the McGillivray Range The Kootenay River seems to be at least a temporary barrier at this point. It is probable that there has been considerable extension and shifting of the ranges of some of the small mammals in the region along the Crowsnet Pass line of the Canadian Pacific Railway within the past 25 or 30 years on account of the logging and big forest fires which have repeatedly swept parts of the region. This is well known to have occurred with some of the more noticeable big game mammals. One form may be wiped out of a district when forest fires sweep over and the deforested territory occupied by other forms as the bush grows up again, bringing different mammal forms into closer alignment than at the period of their evolutionary development.

Other mammals taken by the Academy party were the Mountain Wandering shrew (*Sorex v. monticola*), Columbian ground squirrel (*Citellus c. columbianus*), Richardson red squirrel (*Sciurus h. richardsoni*), Sagebrush white-footed mouse (*Peromyscus m. artemisiae*), Kootenay red-backed mouse (*Clethrionomys g. saturatus*), Mountain long-tailed vole (*Microtus m. mordax*), and Varying hare (*Lepus bairdi cascadensis?*).

Twenty-six additional species were taken by the National Museum party in this region in 1929, as follows:

Cinereous long-tailed shrew (*Sorex c. cinereus*) G,Y

Dusky Shrew (*Sorex o. obscurus*) C,Y

Mountain water-shrew (*Sorex o. navigator*) G,Y

Little brown bat (*Myotis l. lucifugus*) C

Grinnell Yuma bat (*Myotis y. sociabilis*) C

Silver-black bat (*Lasionycteris noctivagans*) C

Pallid lump-nosed bat (*Corynorhinus r. pallescens*) C

Selkirk marten (*Martes a. abietinoides*) Y

Bonaparte weasel (*Mustela c. cicognanii*) Y

Pacific mink (*Mustela v. energumenos*) G,Y

Northern striped skunk (*Mephitis hudsonica*) C,Y

California badger (*Taxidea t. neglecta*) G,Y

Lynx (*Lynx* sp.) Y

Mountain coyote (*Canis latrans lestes*) Y

Northern mantled ground squirrel (*Callospermophilus l. tescorum*)

Buff-bellied chipmunk (*Eutamias a. luteiventris*) C,G,Y

Dusky flying squirrel (*Glaucomys s. fuliginosus*) C,G,Y

Coeur d'Alene pocket gopher (*Thomomys f. saturatus*) C, G

Pacific beaver (*Castor c. leucodonta*) C.

Rocky mountain meadow mouse (*Microtus p. modestus*) C, G, Y

Rocky mountain muskrat (*Ondatro z. osoyoosensis*) C, G. Y

Kootenay jumping mouse (*Zapus princeps*)

Yellow-haired porcupine (*Erethizon e. epixanthum*) C, Y

Rocky mountain snowshoe rabbit (*Lepus b. bairdi*) Y

Yellow-tailed Deer (*Odocoileus virginianus ochrourus*) Y

Rocky Mountain mule deer (*Odocoileus hemionus macrotis*) Y

The following species were ascertained from reliable testimony to be present in limited numbers in parts of the area:

Grizzly bear (*Ursus* sp.) C, G, Y

Cougar (*Felis concolor*) Y

Okanagan hoary marmot (*Marmota caligata okanagana*) Y

Pika (*Ochotona princeps*) Y

Mountain caribou (*Rangifer montanus*) C

Mountain goat (*Oreamnos americanus*) G, K

Papers such as the one under review are very valuable in bringing to light data on the wild life of a region comparatively little known biologically, showing the varied conditions that prevail at different seasons, and the fluctuations in wild life from year to year, particularly where there are no active resident field-naturalists. We shall never approach completeness in our natural history records until every collector and museum worker does what he can to put his knowledge on record, even if it is nothing more than that a certain number of species were taken at a certain place, so that investigators may know that specimens are at least extant in collections, to be examined in detail when desirable.—R. M. ANDERSON, *National Museum of Canada, Ottawa.*

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RECENT DEVELOPMENTS IN WATERFOWL CONSERVATION IN EASTERN CANADA

*By HARRISON F. LEWIS**

AN OUTSTANDING phenomenon which has affected the situation relating to waterfowl conservation in Eastern Canada in recent years is the relatively sudden death of most of the individuals of the plant known as eel-grass (*Zostera marina* L.), which was formerly very abundant on sheltered tidal flats along the sea-coast from Labrador southward. This plant provided an important supply of food for the American Brant and for those Common Canada Geese and Black Ducks that frequented maritime regions. The Brant ate the rootstocks of the plant and depended upon it for the major part of their food when they were within its range, that is to say, during all that part of the year, from autumn to early summer, when they were south of Hudson Bay and Strait. The Common Canada Geese also ate the rootstocks of eel-grass but were not dependent upon it to the same extent that the Brant were, as the Canada Geese, unlike the Brant, often obtained food in fresh water or on marshy or upland areas, and maintained a more varied diet. Dependence of Canada Geese upon eel-grass for food was most pronounced in the northern parts of their coastal winter range, as in southern Nova Scotia, during late winter and early spring, when food on land or in fresh water was made inaccessible to them by ice and snow. Black Ducks were accustomed to feed to a large extent on the ripe seeds of eel-grass, which were obtained from the mud into which they had fallen. They were not particularly dependent upon these, as other sources of food were generally available to them. They seldom ate other parts of the eel-grass plant.

Destruction of eel-grass on a large scale, from some cause not readily perceptible, was observed on the Atlantic coast of the United States south of New York City some three or four years ago. Extending rapidly northward along the seaboard it made its appearance in southern Nova Scotia in 1931, if not earlier. At the end of the year 1931 the scarcity of eel-grass consequent upon this destruction was present around most of the coast of Nova Scotia, along the south shore of Prince Edward Island, and in southern New Brunswick. A year later, at the close of 1932, most of the eel-grass had disappeared from the north shore of Prince Edward Island, from the Magdalen Islands, and from the eastern coast of New Brunswick at least as far north as Tabusintac. When the ice cleared from the St. Lawrence estuary and from the northern part of the Gulf of St. Lawrence in the spring of 1933, it was found that destruction of this plant had taken place along the shores of that region, as far as the Strait of Belle Isle, between Newfoundland and Labrador. A recent report tells of dearth of eel-grass in Placentia Bay, Newfoundland, also, and probably other parts of the coast of that island are affected.

Thus we have evidence that eel-grass is abnormally rare at the present time throughout practically its entire range in eastern North America from North Carolina to Labrador. The Canadian coast involved, from the Strait of Belle Isle to the mouth of the St. Croix River, has a length of more than 3,000 miles. A similar scarcity of this plant is reported from several parts of the coast of western Europe, where it was formerly abundant.

The degree of destruction of eel-grass varies at different times and in different localities, but in general is probably more than 90 per cent. Along the north shore of the Gulf of St. Lawrence in the summer of 1933 I estimated it to be more than 99 per cent. In the Magdalen Islands, in May, 1933, I did not succeed

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in finding as much as one living plant of eel-grass. In areas such as estuaries, where the sea water is markedly diluted by inflow of fresh water, the eel-grass appears to survive better than elsewhere. Probably the completeness of its disappearance in the Magdalen Islands has a direct relation to the fact that these islands contain no rivers or other large supply of fresh water.

During the summer of 1932 extensive tidal flats on the coast of Nova Scotia became fairly well covered with a dense growth of young eel-grass plants, which attained a length of 5 or 6 inches. Most of this growth died subsequently. Similar growth appeared in the summer of 1933, both in Nova Scotia and in the St. Lawrence estuary. The probability is that this will die in a similar way. Growth of this kind probably springs from a stock of seeds of previous years, remaining viable in the mud of the flats. After growing for a few months it appears to be destroyed by the same lethal agency that destroyed the established adult stands of the plant. I know of no valid ground for thinking that the scarcity of eel-grass in eastern North America will soon terminate or is being sensibly ameliorated.

Up to the present time the cause of this sudden and widespread destruction of eel-grass remains uncertain. There are a number of indications that it may be a bacterial disease, and workers in France, Messrs. Fischer-Piette, Heim, and Lami, have published their statement[1] of the discovery of what they take to be the causative bacterium, found in tissues of eel-grass collected on the west coast of France.

American Brant and Common Canada Geese on the Atlantic seaboard of this continent have been seriously affected by this scarcity of eel-grass. Reports obtained by the Canadian Department of the Interior, which has been keeping in close touch with the development of this situation, show marked diminution in numbers of both of these species in the Maritime Provinces and in eastern Quebec Province in the fall of 1932 and the spring of 1933. Many of the Canada Geese and Brant taken by hunters in these provinces in the fall of 1932 were very thin and in poor condition. Some of them were so emaciated that they were considered unfit for human food. The birds were observed to act abnormally, being very restless, moving frequently from one feeding-ground to another, and seeking food in unusual places. In two different areas in Prince Edward Island and in one area in New Brunswick flocks of American Brant were seen in the spring of 1933 to be feeding in upland fields, which are most abnormal feeding-places for them.

At the Bay of Seven Islands, at the northwest angle of the Gulf of St. Lawrence, which is a concentration area much used by Brant on their spring migration, annual counts of the numbers of Brant observed passing northward through the bay are made by an officer of the Canadian Department of the Interior who is stationed there to protect these birds. He reported that 100,400 Brant passed through the Bay of Seven Islands in the spring of 1932 and that the number of these birds that passed the same point in the spring of 1933 was 79,500, indicating a decrease of about 21% in this species in the year between these observations.

Reports received this fall, up to November 4th, by the Department of the Interior from 36 observers in the coastal regions of eastern Canada south of the mouth of the St. Lawrence River, including Robie W. Tufts, the Chief Federal Migratory Bird Officer for the Maritime Provinces, and the present speaker, are nearly unanimous in indicating that both Canada Geese and Brant are much less numerous throughout those regions than they were in the fall two or three years ago. Because there is so much local shifting of the flocks in search of food it is very difficult to give anything like a definite statement of the percentage of this reduction, considering the region as a whole, but there is undoubtedly a severe diminution. One observer, who is a federal officer whose duties cause him to travel over large areas in Prince Edward Island, and who is considered reliable, reported on October 21st that the number of Canada Geese in the district surveyed by him was then less than 10% of normal, and that Brant were present there in small numbers only.

The destruction of eel-grass at Isle Verte, on the south shore of the St. Lawrence estuary, has been so severe that none of the plant was harvested commercially there this year, although under normal conditions such harvesting is an important industry at that place. On October 24, 1933, I found the extensive tidal flats northeast of the village to be about half covered with living young eel-grass, four to five inches long, which showed signs of being diseased. There seemed to be enough of it to furnish an abundance of food for some weeks, at least, to

[1] Comptes Rendus de l'Academie des Sciences, Tome 195, No. 26, p. 1420, Paris, 27 decembre, 1932.

the thousands of Canada Geese and Brant normally to be expected at this place in late October. The birds were not there in anything approaching such numbers. In a search lasting 3½ hours I found only 4 Canada Geese and 60 Brant. Why were they so few? The most probable reason is that they are not now in existence in that general region in large numbers. Reduction in their numbers may have been brought about by scarcity of food in other parts of their range, or by over-hunting, or by disease or injury of some kind that may possibly have affected them as a result of eating dying eel-grass, or by some other cause. It is reported that the flocks of Brant contain birds of the year this fall, indicating a successful breeding season in the Arctic last summer.

This indication of suitable conditions for the raising of young waterfowl in the eastern Arctic last summer is corroborated by the condition this fall of the large flock of Greater Snow Geese as it appeared on its feeding-grounds at Cap Tourmente, near Quebec City, where it was seen in the autumn of last year by the American Ornithologists' Union. Mr. Henry des Rivières, a member of the Cap Tourmente Fish and Game Club, on whose grounds this flock is protected, and Mr. E. F. G. White, of Ottawa, who recently spent two weeks at Cap Tourmente, agree that this flock of Snow Geese contains a high proportion of young birds of the year this fall and shows a marked increase in total number of individuals, as compared with last fall. This increase is estimated to be not less than 1,500 to 2,000 birds. My own estimate of the size of this flock of Snow Geese on October 21, 1932, when this Union visited it, was 9,000 birds. If that is correct, then the present size of the flock, according to the estimates of increase just quoted, should be between 10,500 and 11,000 individuals. The flock has now reached the largest size in its known history.

The number of Blue Geese accompanying the Greater Snow Geese at Cap Tourmente is also greater in 1933 than it was in 1932. On October 21, 1932, I recorded 6 Blue Geese at the place mentioned. I believe 3 or 4 had been shot there earlier that fall. The numbers of this species at this place this fall were estimated by Mr. des Rivières as about 100. The principal concentration-ground of Blue Geese in the fall is in the southern part of James Bay, where they were reported to be plentiful this year in mid-October.

Black Ducks were present on their breeding-grounds in eastern Canada in large numbers last spring. They subsequently had an excellent breeding season, with much fine, dry weather. One effect of this kind of weather is to reduce the number of black flies, which in some areas at least may fatally infect ducklings with the protozoan, *Leucocytozoon anatis* Wickware. As a result of these favorable conditions, Black Ducks have been very numerous this fall in most suitable areas in eastern Canada, although there have been some local exceptions. Despite their having been accustomed to feed to a large extent on the seeds of eel-grass along the coast, the general failure of this plant has not produced a marked adverse effect upon them. This may be due to the fact that so many other foods, in both salt and fresh water, are available and acceptable to them. There is some evidence to show that they still obtain a good many eel-grass seeds from the tidal flats where this plant formerly grew abundantly.

Of other important game ducks in eastern Canada, it may be said that Ring-necked Ducks and Greater and Lesser Scaup Ducks appeared in fair numbers this fall, while a decrease of American Pintail and Green-winged Teal is reported.

Protection of the American Eider Duck along the north shore of the Gulf of St. Lawrence entered upon a new phase this year when the local production of eider-down for commercial purposes, which had been planned for some time, was begun. Under the present law on the subject, this industry can be carried on only under permit from the Department of the Interior, and these permits are granted only when the Department is assured that conditions favorable to the breeding and increase of the Eiders will be maintained. Each permit gives an individual resident of the region the sole right to collect eider-down from the nests of Eider Ducks on certain islands, which are definitely indicated, and which are either owned by him or leased by him from the government of the Province of Quebec. In this way individual control of and interest in the Eider Ducks on each limited area covered by a permit is assured. All the operations of the permittee must be carried on in such a way as to cause no injury to these Ducks and to molest them as little as possible. A system of inspections ensures observance of the permit terms.

In 1933 twenty residents of the north shore of the Gulf of St. Lawrence held permits of this nature, although some of them failed to take any action under their permits. The operations of those who did gather eider-down were generally

very successful and encouraging, despite a general and inevitable lack of practical experience. It was clearly and repeatedly demonstrated that the necessary flushing of the Eiders from their nests, the handling of the eggs to permit the clean down in the bottom of the nest to be removed and to be replaced by a pad of dirty, less desirable down from the nest-border, and the final reduction of the amount of down in the nest to such a pad did not prevent continued incubation and the ultimate successful hatching of the eggs. In some cases, down was removed from a given nest as many as three times, yet there was no observable injurious effect.

The total amount of down gathered under authority of these permits this year was enough to weigh about fifty pounds when thoroughly cleaned. Only a part of this has yet been marketed, but that which has already been cleaned and offered for sale has been disposed of without difficulty. It is sold through ordinary commercial channels and the present retail price is $5.00 a pound. It is expected that the experience gained by the permittees this year will make possible a much larger harvest of down in 1934.

American Eiders in the region in question are still receiving, as they have received for some years past, the benefit of the protection afforded by a series of ten bird sanctuaries established and maintained by the Department of the Interior, as well as of that given by a staff of patrolling officers enforcing a complete close season for these birds. The establishment of leased areas under joint private and public control for the production of eider-down outside of the sanctuaries, which has now been put into effect in the way that I have just described, provides a very useful supplementary protective agency, because it makes unauthorized or harmful molestation of these Ducks less likely and more difficult over these very considerable areas, including some of the best breeding-grounds outside of the sanctuaries, and because it gives the resident human population a strong interest in Eider Ducks apart from their value for food or sport and a powerful incentive to co-operate as fully as possible with governmental conservation forces in increasing the numbers of these birds. Experimental work, with a similar end in view, has been initiated by the Department of the Interior among the Eskimos of Baffin Island.

CHRISTMAS BIRD CENSUSES, 1933

NOTE ON THE NAMES USED IN THE CHRISTMAS BIRD CENSUS REPORTS.–The comments on this subject published by Messrs. W. E Saunders and Theed Pearse in *The Canadian Field-Naturalist* for December, 1933, have been read by the present writer with care and with much interest. The following remarks relate to them.

It is desirable that identifications of birds seen by census takers should be carried by these observers as far as is practicable and no farther and should be reported by them with precision, which should include definite indication of doubt when doubt exists. When this is done, there is neither need nor opportunity for an editorial revision that may affect the original identifications in any way. Of course editorial revision should not make identifications finer than the observer was able to make them. Difficulty has arisen from the fact that in many cases in the past the report furnished by the observer has not done justice to his ability to make identifications in the field.

Vernacular names were originally formed largely by popular usage, but the need for conciseness, certainty, and world-wide comprehension in scientific publication makes it preferable to-day to use for such publication names that conform strictly to a fixed and well-known standard list of such names, with accompanying references to definitions of the concepts that they represent. The Fourth Edition of the "A.O.U. Check-List" is such a list and has been officially adopted by *The Canadian Field-Naturalist* as its standard in this matter. It is this voluntary adoption of this standard by *The Naturalist* and not the original selection of names, either by usage or by a Committee of the A.O.U., that calls for adherence to this standard in the pages of this journal.

The statement that some editorial corrections by the present writer expressed his opinion of the preferable form of the common name of a species and that some of the names thus introduced are no better than those they replaced must be based on a misapprehension. Such changes were made, of course, in order to produce conformity to the standard adopted, namely, the English language nomenclature of the Fourth Edition of the "A.O.U. Check-List" and not be-

cause of personal preference. Personal preferences and local names, such as "Fish Crow" to indicate a form of *Corvus brachyrhynchos* in certain regions, are entirely out of place in the nomenclature used in publications of this kind, which, as has been stated before, must be understandable with certainty at all places and in all times.

This year no changes have been made in any bird census reports without consultation by correspondence with the authors of those reports, whose co-operation is much appreciated. Consequently, the reports as published represent the agreed opinions of their authors and the editorial reviser and it is hoped that they may be found acceptable also to those who read them.—HARRISON F. LEWIS, *Chairman, Bird Census Committee.*

MONTREAL (and vicinity), QUEBEC, DECEMBER 24, 1933.—9.00 a.m. to 4.20 p.m., cloudy, temp. about 18°, 20 inches of snow. Observers together most of the time. Subspecies determined geographically.

American Golden-eye, 2; American Merganser, 8; Canada Ruffed Grouse, 1; Eastern Screech Owl, 1; Northern Downy Woodpecker, 1; Eastern Crow, 1; Black-capped Chickadee, 24; Brown Creeper, 4; Starling, 770 (estimated); English Sparrow, not estimated. Total, 10 species, 812 individuals (plus English Sparrows).

Also seen recently: Herring Gull, Richardson's Owl, Hairy Woodpecker (Northern or Eastern), Northern Shrike (W. J. Brown), White-breasted Nuthatch, Canadian Pine Grosbeak, Eastern Snow Bunting.—V. C. WYNNE-EDWARDS, COLIN NICOL, H. A. C. JACKSON, L. McI. TERRILL (*Members of the Province of Quebec Society for the Protection of Birds*).

OTTAWA, ONTARIO, DECEMBER 24, 1933.—On this date sixteen observers, grouped in six separate parties, took the annual Christmas Bird Census. The sky was heavily overcast throughout the day and the temperature ranged from 12° at 8.00 a.m. to 15° at 3.00 p.m. There was a light wind which varied from north-east in early morning to south-east or even farther south at dusk. During the morning there was no perceptible precipitation, but after noon there developed a misty condition, with occasional light falls of fine snow and sleet, and a steady fall of hail began at 3.30 p.m. and continued until after dark.

Generally speaking, wintry conditions began at Ottawa unusually early this fall and, with slight intermission, continued until census day with exceptional severity. There was a heavy fall of snow as early as October 24th and, although this soon melted, subsequent snowfalls were frequent and there was an unusual number of ice-storms, making conditions of life very difficult for many wild birds. It is estimated that the total depth of snow and hail on the ground near Ottawa on December 24th was at least 18 inches on the average and perhaps more. November, 1933, was the coldest November ever recorded at Ottawa, with a mean temperature of 20.4°, which is twelve degrees lower than the average mean for the month. Sub-zero temperatures occurred several times in November and were frequent in December. No doubt these meteorological conditions were largely responsible for the comparatively small number of birds found by the census-takers.

Attention may be called to the record of a Northern Barred Owl in the census report this year, as this species has not been included previously in a Christmas Bird Census at Ottawa. The Eastern Screech Owl, which was found this year, is also a rarity in our Christmas Bird Census reports, where it has not been recorded since 1923.

A number of species, which are usually present in reports of this nature from Ottawa, such as the Eastern Snow Bunting, Eastern Goldfinch, White-winged Crossbill, and Eastern Purple Finch, are absent from our list this year. On the other hand, the number of American Mergansers reported in this census, namely, 20, is the largest yet recorded in any Christmas Bird Census here, the next largest number recorded being 12 in 1931. The number of Eastern Hairy Woodpeckers included in the census, which was only 1 in 1931 and the same in 1932, is 7, which is probably a more normal number, in this census of 1933.

An Eastern Robin was seen in the Arboretum at the Central Experimental Farm on December 23, but was not observed during the taking of the census.

The parties participating in the taking of the 1933 census and the routes followed, in North, East, South, West order were: (1) Hoyes Lloyd, 8.00 a.m. to 3.00 p.m., south bank of Ottawa River, eastward from Rideau Gate to Ottawa airport, including Village of Rockcliffe Park, property of Federal District Commission, and Beechwood Cemetery, 7 miles on foot; (2) R. M. Anderson, 9.30 a.m. to 11.30 a.m., Ottawa East, including refuse-dump, and north bank of Rideau River to Billings' Bridge, 4 miles on foot; (3)

CHRISTMAS BIRD CENSUS, OTTAWA, ONTARIO, DECEMBER 24, 1933.

Species* of Birds	Route Nos. as in text. 1	2	3	4	5	6	Total
American Golden-eye	7			4	23	2	36
American Merganser				4		16	20
Sharp-shinned Hawk			1	1			2
Canada Ruffed Grouse			5			3	8
Ring-necked Pheasant	1		1				2
Eastern Screech Owl			1				1
Northern Barred Owl					1		1
Eastern Hairy Woodpecker	3		1		2	1	7
Northern Downy Woodpecker	2		1	1	6		10
Northern Blue Jay				1			1
Eastern Crow		2	292	20		1	315
Black-capped Chickadee	17		10	12	74	3	116
White-breasted Nuthatch	6		4		3		13
Red-breasted Nuthatch					1		1
Brown Creeper			1				1
Northern Shrike				1			1
Starling		150	200	33	1		384
English Sparrow	71	40	200	220	35	30	596
Canadian Pine Grosbeak				19	6		25
Redpoll (*Acanthis linaria* (subsp.?))						11	11
Northern Pine Siskin					21		21
Total individuals	107	192	717	316	173	67	1572
Total species	7	3	12	11	11	8	21

* Subspecies determined geographically.

C. E. Johnson, G. Johnson, C. M. Sternberg, Stanley Sternberg, G. W. Dennis, and C. R. Lewis, 9.00 a.m. to 3.00 p.m., Bronson Ave. south to White's Bridge, along C.P.R. track to Metcalfe Road and return on it, 7 miles on foot, 8 by auto; (4) R. E. DeLury and Geo. Clark, 8.00 a.m. to 3.00 p.m., Experimental Farm, Rideau Canal and River to Hog's Back, and beyond nearly to Hunt Club, and return, 10 miles on foot; (5) R. Lockwood and Harlow Wright, 8.40 a.m. to 4.00 p.m., north bank of Ottawa River, Deschenes, Aylmer, Queen's Park, and 2 miles beyond, 14 miles on foot; (6) G. H. Hammond, Harrison F. Lewis, K. A. McElroy, and Peggy Whitehurst, 9.00 a.m. to 4.30 p.m., Hull, Wrightville, Fairy Lake, Ironside, Farmer's Rapids and region N.E. for 3 miles, 18 miles by auto, 8 on foot.—HARRISON F. LEWIS, *Chairman of Bird Census Committee.*

PAKENHAM, ONTARIO, DECEMBER 26, 1933.—9 a.m. to 3.00 p.m., weather dull, raw east wind, snow falling, visibility poor, 18 inches snow, temp., zero. Observers separate; total distance, 12 miles on foot with snowshoes.

Canada Ruffed Grouse, 8; Northern Downy Woodpecker, 1; Northern Blue Jay, 2; Black-capped Chickadee, 11; White-breasted Nuthatch, 1; Starling, 7; Eastern Evening Grosbeak, 4; Eastern Snow Bunting, 41. Total, 8 species, 75 individuals.

Canadian Pine Grosbeak, Redpolls (sp.?), and Hairy Woodpeckers (Eastern or Northern) are present but were not seen on Census Day.—VERNA M. ROSS, EDNA G. ROSS, A. F. ROSS and WILMAR ROSS.

TORONTO, ONTARIO, DECEMBER 24, 1933.—Twenty-nine observers contributed to the ninth Christmas Bird Census of The Brodie Club and the usual routes were taken with the exception of No. 1, in the eastern Don valley, which was not covered. The first observers were in the field by 8 a.m. and activities were concluded at about 4 p.m. Parties were made up as follows:

2.—G. S. Bell, R. G. Dingman, F. S. Dingman, L. L. Snyder, R. B. Wootton, R. J. Rutter, H. M. Halliday and Mrs. G. Evans; 3.—C. E. Hope, H. P. Stovell and Mrs. O. S. Mitchell; 4.—J. L. Baillie, Jr., J. H. Fleming, R. A. Smith and T. M. Shortt; 5.—Dr. P. Harrington, F. A. E. Starr and Mr. Saunders; 6.—R. Amos, J. Armstrong, F. Smith and S. L. Thompson; 7.—H. H. Brown,

CHRISTMAS BIRD CENSUS OF THE BRODIE CLUB—TORONTO—DECEMBER 24, 1933.

Species*	Parties 1	2	3	4	5	6	7	8	Totals
Canvas-back				1					1
Greater Scaup Duck					400				400
American Golden-eye				17	88	4			109
Old-squaw				8	340	450			798
King Eider						1			1
White-winged Scoter				1					1
Hooded Merganser				2					2
American Merganser				2	52	1			55
Ring-necked Pheasant		1	8	8	40	4			61
Glaucous Gull					2				2
Great Black-backed Gull				7	6				13
Herring Gull				61	29	40			130
Ring-billed Gull				4	7	10			21
Eastern Screech Owl		2	1	2					5
Long-eared Owl			1						1
Eastern Belted Kingfisher		1							1
Eastern Hairy Woodpecker				1					1
Northern Downy Woodpecker		5	2	7	1		1	1	17
Horned Lark (subsp.?)				2					2
Northern Blue Jay		5		5			6		16
Eastern Crow		1	1					1	3
Black-capped Chickadee		57	13	27		14	3	4	118
White-breasted Nuthatch		5	2	11					18
Brown Creeper		3		1					4
Eastern Winter Wren				1					1
Eastern Robin		1							1
Eastern Golden-crowned Kinglet				2					2
Northern Shrike			1						1
Starling		22	221	505	17	6		11	782
English Sparrow (Abundant—seen by all parties—not counted)									
Eastern Cardinal		2							2
Northern Pine Siskin				1					1
Slate-colored Junco		1	2	8	15	6			32
Eastern Tree Sparrow				8	15	15			38
White-throated Sparrow			1						1
Swamp Sparrow				2					2
Eastern Song Sparrow			2	7			1		10
Eastern Snow Bunting				44	29				73
Total individuals:		106	255	745	1041	551	11	17	2726
Species totals:		14	13	28	15	12	4	4	
Total number of species seen									38

* Subspecies determined geographically.

F. H. Emery and L. Owens; 8.—O. Devitt, S. Downing, C. Maloney and H. Richardson.

The weather was most unfavourable. Low clouds made it very dull all day and a fine mist-like rain, freezing as it fell, caused discomfort to both human beings and birds. Several observers reported seeing Starlings and Blue Jays apparently suffering from having their plumage soaked with the freezing rain. Everything became coated with ice and those using motor cars found travelling very hazardous. The minimum temperature was 21° and the maximum 28°, with a light N.E. wind, and about 3 inches of snow covered the ground.

In spite of the weather, however, the total of both species and individuals is quite up to the average, but it is interesting that 85 per cent. of the total number of individuals were seen by parties 4, 5, and 6, who worked near the lake shore. Six species were listed that have not appeared before on Brodie Club censuses, namely: Canvas-back, King Eider, White-winged Scoter, Hooded Merganser, and Eastern Belted Kingfisher.

The following additional species have been seen at Toronto during December, 1933, but all managed to elude the census takers: Horned Grebe, American Pintail, Redhead, Buffle-head, Eastern Pigeon Hawk, Eastern Sparrow Hawk, Wilson's Snipe, Great Horned Owl, Snowy Owl, Northern Barred Owl, Short-eared Owl, Richardson's Owl, Northern Flicker, Eastern Meadowlark, Eastern Red-wing, and Canadian Pine Grosbeak. —THE BRODIE CLUB, Per R. J. Rutter, *Secretary*.

VINELAND, ONTARIO, DECEMBER 27, 1933.—9.00 a.m. to 1.00 p.m. Clear; wind south-west; temp. 4° at start; snow 6 to 8 inches deep on ground. About 7 miles were travelled on foot and 12 miles by automobile. Part of the time observers together and part of the time in 2 parties.

Scaup Duck (sp.?), 2; Golden-eye (sp.?), 4; Duck (sp.?), 1; large Hawk (sp.?), 1; small Hawk (sp.?), 1; Ring-necked Pheasant, 3; Herring Gull, 3; Eastern Mourning Dove, 4; Eastern Hairy Woodpecker, 1; Northern Downy Woodpecker, 2; Northern Blue Jay, 11; Black-capped Chickadee, 8; White-breasted Nuthatch, 2; Brown Creeper, 2; Eastern Robin, 1; Eastern Golden-crowned Kinglet, 10; Starling, 100+; English Sparrow, 100+; Slate-colored Junco, 15; Eastern Tree Sparrow (subsp.?), 2. Total, 19 or 20 species, 273+ individuals.

Mammals: Red Squirrel, 1. Mouse and rabbit tracks in snow.—G. H. RICKSON, W. J. K. HARKNESS, W. E. HURLBURT, DOUGLAS ROSS, FRANK STRONG.

HAMILTON, ONTARIO, DECEMBER 27, 1933.—9 a.m. to 5.15 p.m. Clear, 6 inches of snow, bay frozen over completely. Wind strong, south-west; temperature, max. 12° at noon, min. 6° at 5 p.m.

Four parties, totalling eight observers, covering part of Dundas Marsh, Burlington Bay, La Salle Park, Lake Medad, and Sulphur Springs.

Horned Grebe, 3; Common Mallard, 1; Red-legged Black Duck, 400; Canvas-back, 1; Greater Scaup Duck, 2,000; American Golden-eye, 75; Buffle-head, 1; Old-squaw, 12; American Merganser, 70; Eastern Goshawk (?), 1; American Rough-legged Hawk, 1; Northern Bald Eagle, 3; Eastern Sparrow Hawk, 1; Canada Ruffed Grouse, 7; Ring-necked Pheasant, 12; Glaucous Gull, 10; Great Black-backed Gull, 27; Herring Gull, 550; Ring-billed Gull, 2; Eastern Screech Owl, 1; Eastern Hairy Woodpecker, 1; Northern Downy Woodpecker, 11; (Northern) Horned Lark, 22; Northern Blue Jay, 6; Black-capped Chickadee, 65; White-breasted Nuthatch, 8; Brown Creeper, 1; Eastern Winter Wren, 1; Eastern Robin, 4; Starling, 780; English Sparrow, 300; Eastern Cardinal, 2; Slate-colored Junco, 120; Eastern Tree Sparrow, 80; Swamp Sparrow, 1; Eastern Song Sparrow, 8. Total, 36 species, 4,588 individuals.

Also seen recently: December 17. Red-breasted Merganser, 1; Eastern Red-tailed Hawk, 1; Eastern Belted Kingfisher, 2; Northern Pine Siskin, 30. December 22, Eastern Crow, 5; Eastern Purple Finch, 3; Canadian Pine Grosbeak, 6; Eastern Snow Bunting, 15. December 26, Eastern Golden-crowned Kinglet, 1; Carolina Wren, 2.—W. BROWN, R. HAIST, DR. & MRS. G. O. MCMILLAN, G. W. NORTH, H. C. NUNN, R. NUNN, MISS E. SMITH, J. H. WILLIAMS.

LONDON, ONTARIO, DECEMBER 23, 1933.—Combined list of 11 parties, (18 individuals), some working in the morning, others in the afternoon, practically from daylight until dark. Temp. 24° at 8 a.m., 32° at noon, 29° at 8 p.m.; wind medium to fresh, north-east; ground covered with an inch or two of snow; sky overcast; streams pretty well open. Names of species and subspecies are those which, according to the A.O.U Check-List, are supposed to be found here.

Common Mallard, 1; Black Duck (probably both Common and Red-legged varieties represented), 27; American Golden-eye, 107; American Merganser, 302; Eastern Red-tailed Hawk, 4; American Rough-legged Hawk, 6; Eastern Sparrow Hawk, 1; Eastern Ruffed Grouse, 1; Eastern Bob-white, 40 (two coveys of 20 each); Ring-necked Pheasant, 56; Herring Gull, 39; Eastern Screech Owl, 1; Great Horned Owl, 2; Short-eared Owl, 1; Eastern Belted Kingfisher, 9; Northern Flicker, 8; Eastern Hairy Woodpecker, 6; Northern Downy Woodpecker, 25; Northern Blue Jay, 48; Eastern Crow, 585; Black-capped Chickadee, 197; White-breasted Nuthatch, 40; Red-breasted Nuthatch, 2; Brown Creeper, 8; Eastern Golden-crowned Kinglet, 24; Starling, 78; English Sparrow, hundreds; Eastern Meadowlark, 1; Eastern Cardinal, 29; Canadian Pine Grosbeak, 58; Common Redpoll, 12; Eastern Goldfinch, 12; Slate-colored Junco, 18; Eastern Tree Sparrow, 26; Song Sparrow (subsp.?), 5. Total, 35 species, 1779 individuals (plus English Sparrows). Also seen recently, Eastern Robin, 1, and Eastern Evening Grosbeak, 3.—MCILWRAITH ORNITHOLOGICAL CLUB, per E. M. S. DALE, *Chairman Census Committee*.

MITCHELL, PERTH COUNTY, ONTARIO, DECEMBER 26, 1933.—10.30 a.m. to 5.15 p.m. Cloudy, even foggy at times, with some snow-fall, clearing at 2.00 p.m. and becoming cloudy and stormy again just before dark. Visibility poor until about 2.00 p.m., then good. Wind southwest in the morning, changing to west at night; temp. 30° at noon, 24° at 6.00 p.m. Eight inches of ice on river, three or four inches of snow on the ground in the open and eight inches of snow in the woods. On foot in Fullarton Township, from Mitchell eastward for about 3½ miles, then south 2 miles, then west 3½ miles to the Thames River, then following the Thames back to Mitchell; about 12 miles in all.

Sharp-shinned Hawk, 1; Canada Ruffed Grouse, 6; Eastern Screech Owl, 2; Snowy Owl, 1; Eastern Hairy Woodpecker, 1; Northern Downy Woodpecker, 3; Northern Blue Jay, 4; Black-capped Chickadee, 98; Eastern Golden-crowned Kinglet, 23; Cedar Waxwing, 33; Northern Shrike, 1; Starling, 17; English Sparrow, 26; Eastern Purple Finch, 27 (1 flock); Red Crossbill, 50±; White-winged Crossbill, 7; Eastern Snow Bunting, 500± (two flocks). Total, 17 species, 800 ± individuals. The White-winged Crossbills and Red Crossbills formed one flock, feeding from hemlock cones on the ground.—W. G. NEFF.

AWEME, MANITOBA, DECEMBER 28, 1933.—8.00 a.m. to 4.30 p.m. Mostly cloudy; 14 inches of snow on the ground; wind light, S.S.E.; temp., min., –35°, max., –10°. Subspecies determined geographically.

Eastern Goshawk, 1; Canada Ruffed Grouse, 41; Prairie Sharp-tailed Grouse, 23; European Partridge, 11; Eastern Screech Owl, 1; Richardson's Owl, 1; Eastern Hairy Woodpecker, 2; Northern Downy Woodpecker, 1; Northern Blue Jay, 3; Black-capped Chickadee, 7; Canadian Pine Grosbeak, 4; Hoary Redpoll, 47; Eastern Snow Bunting, about 60. Total, 13 species, 202 individuals.

The Ruffed Grouse come to be fed morning and evening and some of them will feed out of our hands.

The small Owls are feeding very largely on English Sparrows. The Richardson's Owl was found with a live Sparrow in its claws and made no attempt to kill it, although watched for some time. The Screech Owl had half a dead Sparrow, which it dropped when scared up. We have often noticed that these small Owls carry about with them food that they do not require at the time.—STUART CRIDDLE.

EASTEND, SASKATCHEWAN, DECEMBER 24, 1933.—Valley of Frenchman River, four miles west of Eastend. 10.00 a.m. to 3.00 p.m. Fairly clear, light northeast breeze, about zero all day. A light dusting of snow, earlier snow in hard-packed drifts. About 7 miles on foot.

Prairie Sharp-tailed Grouse, 5; Sage Hen, 3; European Partridge, 6; Horned Owl (subsp.?), 2; American Magpie, 9; Long-tailed Chickadee, 5; Redpoll (*Acanthis linaria* (subsp. ?)), 12; Eastern Snow Bunting, 2. Total, 8 species, 44 individuals. Seen on December 22nd: Evening Grosbeak (subsp.?), 2.—LAURENCE B. POTTER.

RED DEER, ALBERTA, DECEMBER 25, 1933.—Clear; wind south, light; temp., –30° to –26°; snow 12 to 15 inches deep on the average. Observations made in part at a feeding-station in my yard, in part during a walk of 1½ miles on the border of the town, leaving home at 2.00 p.m.

Downy Woodpecker (probably Northern, possibly Nelson's), 5; Northern Blue Jay, 3; American Magpie, 3; Long-tailed Chickadee, 15; English Sparrow, 8; Western Evening Grosbeak, 8 to 10; Pine Grosbeak (subsp.?), 1; Common Redpoll, 30. Total, 8 species, 73 to 75 individuals.—M. P. COLE.

SUMMERLAND, OKANAGAN LAKE, BRITISH COLUMBIA, DECEMBER 20, 1933.—8 a.m. to 3 p.m. Cloudy and attempting to rain, very strong south wind all day, temperature averaging about 35°, snow varying from 19 inches in hills to slush and ice on the lake front. By car along 12 miles of lake front, thence on foot over adjoining fruit benches back to pine-clad hills. Observers separate.

Common Mallard, 6; American Golden-eye, 4; Goshawk (subsp.?), 1; Duck Hawk, 1; Pigeon Hawk (subsp.?), 1; Hawk (sp.?), 1; Ruffed Grouse (subsp.?), 2; California Quail, 480; Ring-necked Pheasant, 152; American Coot, 200; Killdeer, 2; Wilson's Snipe, 3; Herring Gull, 11; Red-shafted Flicker, 36; Woodpecker (*Dryobates villosus* (subsp.?)), 4; Batchelder's Woodpecker, 1; Black-headed Jay, 9; American Magpie, 61; Northern Raven, 3; Western Crow, 1; Clark's Nutcracker, 2; Long-tailed Chickadee, 16; Mountain Chickadee, 12; Slender-billed Nuthatch, 4; Red-breasted Nuthatch, 1; Dipper, 1; Western Robin, 65; Western Golden-crowned Kinglet, 4; Bohemian Waxwing, 115; North-western Shrike, 2; English Sparrow, 120; Western Meadowlark, 3; Red-wing (*Agelaius* (sp.?), 40; Western Evening Grosbeak, 8; Common Redpoll, 15; Pale Goldfinch, 110; Red Crossbill, 14; Slate-colored Junco,

15; Shufeldt's Junco, 523; Western Tree Sparrow, 5; Gambel's Sparrow, 1; Rusty Song Sparrow, 35. Total, 42 species, 2090 individuals.—ERIC M. TAIT, HERBERT M. SIMPSON, S. A. LIDDELL.

PLEISTOCENE AND POST-PLEISTOCENE MOLLUSCAN FAUNAS OF SOUTHERN SASKATCHEWAN[1]

By LORIS S. RUSSELL

WITH DESCRIPTION OF A NEW SPECIES OE GYRAULUS

By FRANK COLLINS BAKER[2]

INTRODUCTION

EXTENSIVE investigations of the surface deposits in Saskatchewan by officers of the Geological Survey of Canada have had as one result the collection of numerous fossil mollusks from beds of interglacial and postglacial age. Some of this material was submitted to Mr. Allan Mozley, of Johns Hopkins University, who identified the species and published[3] a description of a new variety. Later, additional localities for these shells were discovered, and a collection of the living mollusks of the region was also made. When the study of the combined collections was undertaken by the writer, he found it necessary to submit a number of specimens to Dr. F. C. Baker, of the University of Illinois. Dr. Baker, in turn, forwarded the Physidae to Dr. William J. Clench, of Harvard University. The contributions made by these gentlemen to the present study are indicated in the faunal lists below. In addition, the writer is indebted to his colleague, Mr. A. La Roque, for helpful criticisms and assistance.

FAUNAL LISTS

In the following lists the localities of each species are indicated by letters in the columns on the right. These various letters refer to the authority for the particular identification, as follows: B, Dr. F. C. Baker; C, Dr. W. J. Clench; M, Mr. Alan Mozley; R, the writer.

LIST OF MOLLUSCA FROM INTERGLACIAL DEPOSITS

	Rosetown	Lake Johnstone	Scotsguard	Blooming	Beaubier
Pisdium cf. *superius* Sterki	R	.	.	.	.
P. cf. *rotundatum* Prime	R	.	.	R	
P. sp.		R	R	.	.
Stagnicola palustris elodes (Say)	.	.	.	.	R
S. palustris nuttalliana (Lea)	.	.	B	.	R
S. saskatchewanensis (Mozley)	.	.	.	.	M
S. emarginata canadensis (Sowerby)	B	.	.	.	R
S. n. sp.	.	.	B	.	.
Gyraulus altissimus (F.C.Baker)	R	.	R	.	
G. cyclostomus F.C.Baker, n. sp.	B	.	R	R	.
Physa gyrina Say	.	.	R	M	M

INTERGLACIAL LOCALITIES

Rosetown. Railway cut in SE.¼, sec. 17, tp. 27, rge. 16, W. 3rd meridian. R. T. D. Wickenden.

Lake Johnstone[4] Railway cut in SW.¼, sec. 25, tp. 14, rge. 1, W. 3rd merid. Wickenden.

Scotsguard. NE¼, sec. 35, tp. 8, rge. 16, W. 3rd merid. Wickenden.

Blooming[4] NW.¼, sec. 25, tp. 2, rge. 18, W. 2nd merid. Wickenden.

Beaubier[4] Canadian Pacific Railway cut about 1 mile east of Beaubier station. Wickenden.

The particular stage or stages to which these interglacial deposits belong cannot be determined at present. Presumption favours correlation with the last or Peorian interval.

1 Published with the permision of the Director, Geological Survey of Canada, Department of Mines, Ottawa.

2 Museum of Natural History, University of Illinois, Urbana, Ill., U.S.A.

3 Amer. Midland Nat., vol. 13, pp. 236-240, figs. 1-5, 1932.

4 See Geol. Surv. Canada, Summ. Rept., pt. B, pp. 66, 67, 1931.

LIST OF MOLLUSCA FROM POSTGLACIAL DEPOSITS

	Wood Mountain	Beaubier
Sphaerium simile (Say)	R	.
Pisidium compressum Prime	R	.
Stagnicola palustris elodes (Say)	.	R
S. palustris nuttalliana (Lea)	.	R
Lymnaea stagnalis subsp. indet.	.	R
Succinea chrysis Westerlund	R	.
Helisoma subcrenatum (Carpenter)	.	B
H. antrosum striatum (F.C.Baker)	B	.
Gyraulus altissimus (F.C.Baker)	R	R
Physa heterostropha Say	R	.

POSTGLACIAL LOCALITIES

Wood Mountain. Railway cut in silt about 4 miles northeast of Wood Mountain station. C. M. Sternberg.

Beaubier. Road cut in silt near Canadian Pacific Railway, about 1 mile east of Beaubier station. Postglacial age not certain. R. T. D. Wickenden.

LIST OF LIVING MOLLUSCA

	Invermay	Wadena	Allan Hills	Melville	Moosejaw	Willows
Pisidium sp.	.	R	.	.	.	.
Lymnaea stagnalis jugularis Say	R	R	.	R	R	.
Stagnicola palustris elodes (Say)	.	R	.	.	R	.
S. palustris nuttalliana (Lea)	.	R	.	R	R	.
Helisoma subcrenatum (Carpenter)	R	R	R	R	R	.
Gyraulus altissimus (F. C. Baker)	.	R	.	.	.	.
G. cyclostomus F. C. Baker, n.sp.	.	R	.	.	.	.
Physa gyrina Say	.	C	.	.	.	.
Aplexa hypnorum (L.)	.	R	.	.	.	.
Succinea chrysis Westerlund	.	.	.	.	.	R
S. grosvenori (Lea)	.	B	.	.	.	.
Euconulus fulvus (Müller)	.	B	.	.	.	.

LOCALITIES OF LIVING MOLLUSCA

Invermay. Two miles west of Invermay. R. T. D. Wickenden.

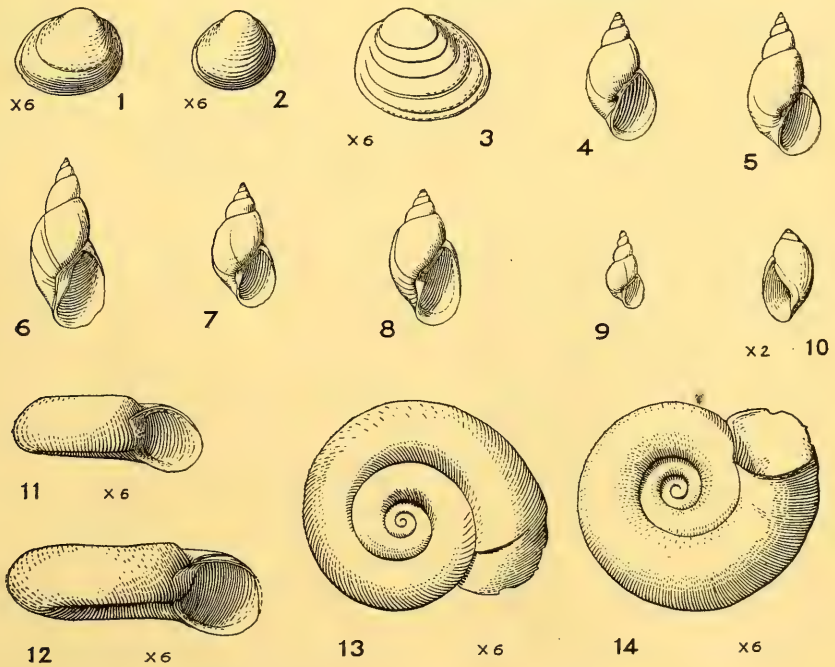
Wadena. North shore of Fishing lake. Wickenden.

Allan Hills. SE.¼, sec. 2, tp. 32, rge. 3, W. 3rd merid. Wickenden.

Melville. About 9 miles northeast of Goodeve. Wickenden.

Moosejaw. Sandy Creek water works. Wickenden.

Willows. East side Lake of the Rivers, near south end. Wickenden.



For figure references, see page 37

DISCUSSION

The genus *Pisidium* is well represented in the Pleistocene fauna. Species of this genus are very difficult to identify in the absence of type material. The shell represented in fig. 1 closely approaches *P. superius* Sterki in form but differs in the presence of straight, rather than curved, cardinal teeth. A second species is characterized by a more abbreviated, convex, and nearly orbicular shell (fig. 2), resembling that of *P. rotundatum* Prime. Here again the cardinal dentition differs, especially the right tooth, which is straight, and not noticeably expanded posteriorly. A relatively shallow, moderately elongate shell (fig. 3) represents a third species, which the writer is unable to identify. In this form the cardinal teeth are prominent, the right one curved, and expanded behind, the left two narrow, nearly straight, and close together. Pelecypods are not so important relatively in the recent faunas. The three species of *Pisidium* mentioned above are replaced by other forms. The genus *Sphaerium* appears among the postglacial fossils and doubtless is also present in the living fauna.

Among the Pleistocene Gastropoda of this region the Lymnaeidae form the most conspicuous element. Most of the specimens are referable to *Stagnicola palustris*. These include only one example of *S. p. elodes*, which is represented in figure 6. *S. p. nuttalliana*, in contrast, is abundant, although most of the specimens are somewhat smaller than the average for this subspecies. A broad, short-spired variety is represented by a few specimens, such as that shown in figure 8. *S. palustris* is even more abundant in the recent faunas; here the specimens are of larger size, and both the subspecies *elodes* and *nuttalliana* are well represented.

Stagnicola emarginata canadensis is represented in the Pleistocene by a number of specimens, all somewhat below average size, possibly slightly immature. This includes the specimens from Beaubier identified by Mozley[5] as the typical *Lymnaea vahlii*. *S. e. canadensis* is not present in the postglacial and modern collections from Saskatchewan, but is known at other localities from Michigan to the Mackenzie district. The shell described by Mozley[6] as *Lymnaea vahlii saskatchewanensis* is illustrated here by a drawing of the holotype (fig. 9). This is a small form, with attenuate spire. If, as here suggested, the shells identified by Mozley as *L. vahlii* do not pertain to that species, the subspecies *saskatchewanensis* may be raised to the rank of a species until its affinities are more clearly understood. This species also is absent from the recent faunas.

The form listed as *Stagnicola* n. sp. is illustrated in figure 5. It has an elongate shell, with somewhat flattened whorls and few revolving lines; it is absent from the recent collections. Dr. Baker is not yet prepared to define this species.

The most conspicuous among the living Lymnaeidae of this region is *Lymnaea stagnalis jugularis*, represented by numerous specimens, some of which reach more than average size. In the postglacial fauna *L. stagnalis* is represented only by a single immature specimen, which cannot be identified as to subspecies. In the Pleistocene collection the species is entirely absent.

The Planorbidae of the Pleistocene fauna are all small forms, belonging to the genus *Gyraulus*. *G. altissimus* (fig. 11) is well represented in the interglacial, postglacial and modern collections. The new species, *G. cyclostomus* (figs. 12-14), is moderately abundant in the Pleistocene, and apparently survives in the modern fauna, where it is represented by a few specimens from Wadena. Shells of the genus *Helisoma*, so abundant in the recent faunas, are conspicuously absent from the Pleistocene collection. *H. subcrenatum*, the commonest living species, resembles the well known *H. trivolvis*, but lacks the distinct keels above and below. *H. antrosum striatum* is represented by two specimens in the postglacial collection.

The specimens of *Physa gyrina* in the interglacial fauna are extremely small (fig. 10); those in the modern collection are somewhat larger, but well below average size for this species. *P. heterostropha* is represented by a single specimen in the postglacial fauna. The remaining species in the recent faunas are noteworthy only for their absence from the Pleistocene.

The general relationships between the molluscan faunas of the Pleistocene and the Recent in southern Saskatchewan cannot be postulated with certainty from small collections such as those studied here. However, certain conclusions may be offered tentatively, in the hope that they will stimulate further search for interglacial fossils in this area. The present material indicates that the Pleistocene fauna here was a reduced assemblage of small forms. This suffered severely from the return of glacial conditions, being not only driven out of the area, but also in part destroyed. The postglacial fossil mollusks are not survivors of the local interglacial fauna, but rather forerunners of the existing fauna. The latter is a fairly rich assemblage, characterized especially by

5 Amer. Midland Nat., vol. 13, p. 240, fig. 4, 1932.
6 Op. cit., p. 236, figs. 1-3.

abundant examples of *Lymnaea stagnalis jugularis* and *Helisoma subcrenatum*. Apparently climatic conditions in southern Saskatchewan are more favourable to the molluscan fauna today than during interglacial time.

DESCRIPTION OF A NEW SPECIES OF GYRAULUS

By FRANK COLLINS BAKER

Gyraulus cyclostomus, sp. nov. Figs. 12-14

Shell depressed, periphery rounded; colour dark horn, surface dull, sculpture of coarse oblique growth lines crossed by fine spiral lines; whorls four, rapidly enlarging; spire flat, whorls coiled in the same plane, rounded, sutures deeply impressed or even channeled; body whorl little depressed near the aperture; base flattened but little concave, exhibiting all whorls to apex, the whorls flatly rounded with marked sutures, the body whorl well rounded; aperture rounded, rarely slightly oblique; outer lip simple slightly thickened within; parietal wall with distinct white callus rendering the aperture entire in most specimens.

Length	Diameter	Aperture L.	Diameter	
2.00	5.3	1.5	1.5 mm.	Holotype
1.8	5.2	1.5	1.4 mm.	Paratype
2.0	4.9	1.5	1.5 mm.	"
1.8	5.0	1.7	1.7 mm.	"

Type locality: Rosetown, Saskatchewan. Interglacial.

Types: Geological Survey of Canada; holotype, No. 8038; paratypes, Nos. 8038a-c.

This little *Gyraulus* differs from all American species in the rounded aperture which is also a notable character of young and immature specimens. It differs from *parvus, altissimus,* and *circumstriatus* in the rounded whorls of the base and in the absence of any appearance of reaming so conspicuous in these species.

(*Explanation of Figures*)

SASKATCHEWAN PLEISTOCENE MOLLUSCA. Figures natural size unless otherwise marked. Fig. 1, *Pisidium* cf. *superius* Sterki, Rosetown. Fig. 2, *Pisidium* cf. *rotundatum* Prime, Rosetown. Fig. 3, *Pisidium* sp., Lake Johnstone. Fig. 4, *Stagnicola emarginata canadensis* (Sowerby), Rosetown. Fig. 5, *Stagnicola* n. sp., Scotsguard. Fig. 6, *Stagnicola palustris elodes* (Say), Beaubier. Fig. 7, *Stagnicola palustris nuttalliana* (Lea), Scotsguard. Fig. 8, *Stagnicola palustris nuttalliana,* variety, Scotsguard. Fig. 9, *Stagnicola saskatchewanensis* (Mozley), holotype, Beaubier. Fig. 10, *Physa gyrina* Say, Beaubier. Fig. 11, *Gyraulus altissimus* (F. C. Baker), Lake Johnstone. Figs. 12-14, *Gyraulus cyclostomus* F. C. Baker, n. sp., holotype, Rosetown; the revolving lines are barely discernible and cannot be represented on this scale.

SOME VANCOUVER ISLAND BIRD NOTES

By HAMILTON M. LAING

THE FIRST indication of the Solitary Sandpiper at Comox was on August 8, 1931, when a juvenile of this species was observed in a pool of Brooklyn Creek just before the door. This bird escaped, but on the 18th of August, 1932, another bird noted in the same pool was secured, definitely adding it to the list. Next day while camped with my wife at the outlet from Paradise Meadows at an elevation of about 3500 feet I secured another juvenile of this species at a small meadow pond. Though only one of the birds—both males—shows the flecking of the primaries, both were considered the western form (*Tringa s. cinnamomea*) and the identification was checked by Dr. L. B. Bishop who examined the birds.

On May 19th, 1932, while on a collecting expedition by rowboat around Denman and Hornby Islands a Yellow-headed Blackbird was taken at Tree Island, one of the outer group that comprises the Denman Island Spit. This surprise, a young male, is but another example of the birds of the interior of British Columbia wandering over to the coast country. I know of no other definite record of this bird west of the mainland.

In 1932 it was established that one, at least, of the three-toed woodpeckers is a breeding species on Vancouver Island. Three-toes previously had been known in the region behind Comox for several years but were always observed under conditions where the taking of a specimen was impossible. On June 15th at an elevation of about

4000 feet the unmistakable note of this woodpecker drew me off across the snow to find a fine male "ladder-back" busy on the trunk of a mountain hemlock. He was examined at twenty feet. Later in the season, on August 19, while en route to Paradise Meadows another of these elusive birds was found and secured. This proved to be a juvenile female doubtless not far from the nest site. On three occasions in the next four days the notes of this species were heard again but no adults were secured. As previous sight and sound observations cover September and March, doubtless the bird is resident here and of the western form (*Picoides a. fasciatus*).

The breeding of the Sooty Fox Sparrow, as observed in 1932 in the Comox area, would seem noteworthy also. Though it had been felt for some time that the bird should breed locally, it was not till May 21st that it was located. On that day while moving camp at dawn—such hours being necessitated by the vagaries of wind and tide—the strain of a Fox Sparrow came out across the water nearly half a mile from the northerly end of Hornby Island. The secret was out and latter two adults and a fully fledged young were secured within a few yards of shore. These are exceedingly dark birds with a complete absence of yellow in the bill—the lower mandible being distinctly bluish. It is noteworthy that of several Fox Sparrows referable to this form (*Passerella i. fuliginosa*) taken in winter at Comox, identified by H. S. Swarth, only one, of date April 2nd, shows the bluish lower mandible. All other forms show yellow in the bill. That this is a seasonal change might be proved. That this form breeds "at high elevations (Canadian zone) in southern Vancouver Island" (Brooks and Swarth Distributional List of Birds of British Columbia) would seem also to show that unless the bird has wondrous diversity of breeding habitat, there may yet be confusion in the darkest race of *Passerella*.

NOTES AND OBSERVATIONS

HOLBOELL'S GREBE IN NOVA SCOTIA—Holböell's Grebe (*Colymbus grisegena holboelli*) occurs in Nova Scotia with more or less regularity, and one or more authentic records for the species are available for all months except June, July, August and September. These are as follows:

January, 1880: One was picked up dead by the roadside near Chester, Lunenburg County, and was taken to a taxidermist for mounting. The specimen is now in possession of Mr. G. L. Bishop, Greenwich, Kings County, Nova Scotia.

February 3, 1933: Near Middletown, Annapolis County, one of these grebes was picked up and sent to me in the flesh for identification. The bird was much emaciated. This specimen is now in the possession of Mr. R. W. Smith, Wolfville.

March 4, 1904: In the Provincial Museum at Halifax is a specimen which was taken on this date at Three Fathom Harbour, Halifax County.

April 9, 1891 *and April* 25, 1894: On these respective dates specimens were taken in Halifax County according to the records of Mr. Harry Piers, Curator of the Provincial Museum at Halifax.

May 13, 1917: One was seen at close range by myself at Sunken Lake, Kings County.

May 1, 1885: Mr. Harry Piers also supplies this record, it being a bird taken in Halifax County.

October 24, 1915: Three or four were seen by me on a small freshwater lake at Camperdown, Lunenburg County.

October 4, 1919: One was taken by me at Riverport, Lunenburg County.

November 17, 1921: One was taken at Clam Bay, Halifax County, by myself. The bird was in a small fresh-water pond that was almost entirely frozen over. This specimen is in my collection at Wolfville.

December 16, 1899: A specimen taken in Halifax County, according to the records of Mr. Harry Piers.

In addition to the foregoing I recorded three birds in full breeding plumage on April 16, 1926, along the shore of Kents Island, which is one of the Grand Manan group in New Brunswick and is less than fifty miles from the Nova Scotia coast. In discussing its occurrence with Mr. Allan Moses of North Head, Grand Manan, who is a reliable observer, I was told that Holböell's Grebes are regularly seen along the Grand Manan shores in both spring and fall.—R. W. TUFTS

DO CADDIS FLY LARVAE KILL FISH?—It is a well known fact that the larvae of caddis flies form a part of the diet of many species of fish. It may not be such common knowledge that these insects may reverse the process and become the means of killing the young of the fish themselves. In the spring of 1933, while the run of seaward migrating pink salmon (*Oncorhynchus gorbuscha*) fry was being enumerated at McClinton Creek, Massett Inlet, British Columbia, under the writer's direction, the counters drew attention to the fact that often the small fish, 1¼ to 1½ inches in length, were found inside empty caddis cases. Upon the examination and observation it was decided provisionally that the fish had chosen the case merely as a means of protection. On April 24th, one of the type of caddis larvae which construct a case of particles of sand, was found with its head extended, tightly grasping a fry which was still alive. There was quite a definite ring round the fish behind the head where the legs of the insect had been holding. Later several similar cases were observed. In some of these the fish was drawn almost wholly into the case and its head was apparently chewed. It appears, therefore, that there is no doubt that the insect and its case may on occasion become the means of death for some fry.—A. L. PRITCHARD, *Pacific Biological Station, Nanaimo, B. C.*

WHITE HERONS IN SOUTHERN ONTARIO.—There have been numerous reports of unusual numbers of white herons through July and August from Toronto, Wheatley, Port Stanley, St. Thomas, Aylmer and Kingsville. The species in most cases have not been very well determined and the numbers reported have been from two individuals to three hundred. Even allowing for considerable exaggeration it is evident that there has been a quite considerable flight of white herons, egrets or both into the more southern localities of eastern Canada this season (1933).—P. A. T.

THE HOG-NOSED SNAKE (*Heterodon contortrix*) IN PARRY SOUND DISTRICT, ONTARIO.—The hog-nosed snake (*Heterodon controtrix* (Linné)) is not uncommon in the neighbourhood of Deer Lake (Wah Wash Kesh), a lateral to the Magnetawan River, Parry Sound District, Ontario. It has been found in the vicinity of Magnetawan, Chapman township, and at Island Lake seven miles north of Deer Lake.

The adults are generally a dull sage, occasionally lightly striped, not well-marked, rarely showing the bright checked pattern seen farther south. A specimen which I saw dead on the road some years ago near Deer Lake was larger than any I have found in any place, viz., about 32 inches.

Clifford Bennett on whom I depend to secure specimens of these snakes, says that they are found mostly in high, dry places, usually in areas covered by second growth.—HOWARD A. KELLY.

NOVA SCOTIA GETS WILLOW PTARMIGAN.—On March 13th, 1933, fourteen Willow Ptarmigan (*Lagopus lagopus albus*) were liberated near Waverly, Halifax County, N.S. These were the survivors of a shipment of seventeen birds brought here from northern Manitoba as a result of negotiations which have been carried on by Lt. Col. R. B. Willis of Halifax. In releasing the birds Col. Willis was assisted by Mr. H. L. Fennerty and other officers of the Department of Lands and Forests. The crates were taken, with considerable difficulty, to a point about six miles from the Old Guysboro Road and the birds were there given their freedom. This constitutes the first attempt on record to introduce ptarmigan in this province and the experiment is being followed with much interest. On April 20th, 1922, a male ptarmigan (sp.?) in winter plumage was shot near Elmsdale, Hants County, N.S., this being the only record for the province. This specimen was mounted and is now in the Provincial Museum at Halifax, Acc. No. 5090. It is generally believed that it came from Newfoundland, possibly having been blown across by a storm.—R. W. TUFTS.

NOTE ON THE RANGE OF *Valvata lewisi ontariensis* F. C. Baker.—*Valvata lewisi ontariensis* F. C. Baker was described in the *Nautilus* for April, 1931, the type locality being Shakespeare Island Lake, Ontario. In his remarks, Dr. Baker mentions Kimmewin Lake, north of Drayton, Ontario, as another locality and adds that "the shells mentioned by Whiteaves (*Ottawa Naturalist* 19:65, 1905) from the Kawinogans River, Ont... are probably this variety".

On looking up Whiteaves' specimens, I find that they agree very well with Baker's variety. These are N.M.C. (Mollusca) Cat. No. 2180—*Valvata lewisi ontariensis* Baker, Kawinogans River, Attawapiskat; Coll. W. McInnes, 14/7/04—4 specimens.

In the National Museum collections there is another specimen of *Valvata lewisi ontariensis* from Lac Seul, Ontario, collected by F. W. Waugh in 1919.

It is probable, therefore, that this variety will be found over the greater part of northwestern Ontario and possibly in Eastern Manitoba and northern Minnesota.—A. LA ROCQUE.

CORRECTION.—In issue of January, 1934, Vol. 48, No. 1, under Book Reviews, "Birds and Mammals from the Kootenay Valley, British Columbia," page 23, 2nd column, beginning on line 9, should read as follows:

They were carefully compared with 69 specimens of *E. a. affinis* (Columbian Chipmunk) and 4 intermediates (*affinis* x *luteiventris*) from British Columbia, 53 *luteiventris* from British Columbia and 35 from Alberta. Six males and 13 females in the Academy collection from Creston proved to be fairly typical *affinis*. Two of the females differ somewhat from the others and are apparently intermediates between *affinis* and *luteiventris*, but none of them seemed to show any approach to *E. r. simulans*.—R. M. ANDERSON.

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The Canadian Field-Naturalist

VOL. XLVIII OTTAWA, CANADA, MARCH, 1934 No. 3

INTERESTING BIRD RECORDS FOR SOUTHERN BAFFIN ISLAND[1]

By J. DEWEY SOPER

THE WRITER'S first ornithological inquiries in Baffin Island were made during the course of the Canadian Arctic Expedition of 1923; this was followed by a residence on the island from the summer of 1924 until the autumn of 1926. The results of the wild life investigations on these occasions, for the National Museum of Canada, were incorporated in a report "A Faunal Investigation of Southern Baffin Island", published by that institution in 1928. The subject matter of the present paper has to do with new, or unusual, records of bird life which the writer has gathered since that time on two expeditions to Baffin Island, for the Department of the Interior, Ottawa, Canada. The first of these was to Foxe Peninsula 1928-1929, and the second, to the Lake Harbour region, 1930-1931.

The results of the final investigations of these two expeditions have been submitted to the Department of the Interior. In the published report of 1928, 85 species of birds are listed for the island, based chiefly on the observations of Kumlien, Hantzsch and the writer. The field work since done by the latter has added five new species to the island's avifauna, bringing the present list up to 90 species.

The object in writing the present paper, referring to 16 species, is not only to draw attention to the species newly added to the Baffin Island list, but to record other matters of interest and importance with reference to distribution, breeding habits and rare material collected. Considerable space has therefore been devoted to several of the species herein segregated from the expedition manuscripts, with a view to making available observations that are deemed sufficiently unusual in character to justify the preparation of a special paper.

In many respects the western tundra portion of Baffin Island holds much greater interest for the ornithologist than the mountainous regions of the east, though each possesses a bird life which is both characteristic and peculiar. The migration and nesting of geese and waders on the western plain are particularly notable and to a large degree unique. Recent penetration of the tundra lands there is directly responsible for the possession of a fund of ornithological data not to be obtained elsewhere in the eastern Arctic. Bird life is particularly rich in the Bowman Bay region of the southwest; there the best opportunities were presented for studying the occurrence, migration and breeding habits of various species which do not breed, and appear but rarely if at all during migration, in the more rugged country to the eastward.

All natural-history material collected on the various Baffin Island expeditions has been permanently deposited in the National Museum of Canada.

Phalacrocorax auritus auritus (Lesson). DOUBLE-CRESTED CORMORANT.—In February, 1931, a skin of this species was obtained through the Hudson's Bay Company from an Eskimo in Frobisher Bay. The native who shot it stated that it was secured during the preceding summer while it was drinking on the margin of a small lake, near the sea, between Ward Inlet and Mingooktok. It is said to be the first example of a cormorant that the Eskimos, or others, have ever observed in that part of the country. During the course of his investigations from 1923 until 1931, the writer never saw a cormorant on Baffin Island, nor, until the above occasion, had any report of it been secured from the natives.

This is the first record of the Double-crested Cormorant for Baffin Island. According to Kumlien's report of 1879, the European Cormorant (*P. c. carbo*) was a regular breeder in Cumberland Sound; it did not appear to be common, but was said by the Eskimos to be plentiful in some years. There are evidently no records ex-

* Published by permission of the Dominion Lands Administration, Department of the Interior, Ottawa, Canada.

1 This paper was written in February, 1932. J.D.S.

tant to show that anyone, since Kumlien's time, has seen a cormorant in Cumberland Sound, or elsewhere in Baffin Island, with the exception of the above record.

Cygnus columbianus (Ord). WHISTLING SWAN.—Eskimo: *Kuodjuk*.—Until 1928 the Whistling Swan was known only as a migrant in Baffin Island. While the writer was camped at the Eskimo settlement of Nuwata on August 27, 1928, a native hunter brought to camp four nearly full-grown, but flightless, immatures of this species which he had killed with stones on the low, coastal plain a few miles inland from the sea. The Eskimos state a few breed in this region each year, but on the whole they are very rare in Foxe Peninsula. This is the first authentic record of the breeding of the Whistling Swan on Baffin Island.

While the writer was living with the Eskimos at Nuwata, a hunter related to him that he had observed a nesting pair of *kuodjuks* a few years previously, near the mouth of the Kommanik River at Foxe Basin. Strangely enough, though no swans were noted by the writer, during the summer of 1929, about Bowman Bay, or along the south coast of Foxe Basin, a pair of adults with two large young of the season were encountered on the Kommanik River, on August 13, about five miles from the sea. Probably these were the identical swans which the Nuwata Eskimos had seen several years before.

Branta bernicla hrota (Muller). AMERICAN BRANT.—Eskimo: *Nedleokjuk*.—Until 1928 the American Brant was known only as a very sparing migrant in Baffin Island along its south coast from Amadjuak Bay to Cape Dorset. In the spring of 1929 it was first observed at Camp Kungovik on June 7, when a flock of 26 individuals passed over to the north. From this date until June 24 the species was common in the locality as it migrated northward or tarried to rest and feed on the surrounding tundra in company with Hutchin's, Blue and Snow Geese. After the above date the Brant gradually diminished in numbers until they virtually disappeared from the region in late June.

For a period of nearly a month, following the record of a small flock of four birds on July 1, not a single individual was observed until July 27, when a pair of adults was seen at Cape Alberta with two downy young about three days old. Between Cape Alberta and the mouth of the Kommanik River no Brant were observed during early August, but while ascending this river on the 13th, a pair was noted with two well-grown flightless young, and the following day another pair was seen on the river near Ungmaluktuk Lake. In late June, 1931, a number of migrants were observed at Lake Harbour.

Chen caerulescens (Linnaeus). BLUE GOOSE.—Eskimo: *Kungovik*.—This species has long been known as a migrant in Baffin Island. Only after years of search, however, was the breeding ground of the species finally discovered by the writer on the tundra of western Baffin Island, in the vicinity of Bowman Bay. A full account of this was published in *The Blue Goose*, 1930, by the Northwest Territories and Yukon Branch (now Dominion Lands Administration), Department of the Interior, Ottawa.

Dafila acuta tzitzihoa (Vieillot). AMERICAN PINTAIL.—Eskimo: *Adla*.—A female of this species was collected at Cape Alberta on July 25, 1929. It constitutes, so far as known, the first record of this species in Baffin Island. The two Eskimos accompanying the writer were greatly astonished at the appearance of this bird, as neither of them had ever observed it or received any information about the species from other natives, even of the older generation. Consequently, no Eskimo name for it existed; at the suggestion of the writer they coined the name "Adla", meaning "the stranger". Upon arrival at Cape Dorset further enquiries were made among the Eskimos there, but none of them had any knowledge of the bird. The solitary individual taken was frequenting a small lake in the lowlands in company with Old-squaws and female King Eiders with broods of young. It was in a moulting condition with all the wing primaries missing, as well as the longer feathers of the tail.

Histrionicus histrionicus histrionicus (Linnæus). EASTERN HARLEQUIN DUCK.—Eskimo: *Tungavia*.—Previous to the expedition of 1930-31, this species had been observed in Baffin Island only at Cumberland Sound. Kumlien saw three and collected one in 1878, and the writer, in 1924, collected an adult female and six partly fledged juveniles. It was considered to be rare in Baffin Island. In the spring of 1931, however, it was observed on numerous occasions from June 5, on into July, from Lake Harbour southeastwardly to McKellar Bay. A female taken on June 8 possessed greatly enlarged ovaries indicating a near approach to nesting. No nests were found, but the Eskimos state that the species breeds in this district each year. It is undoubtedly much more common in extreme southeastern Baffin Island than has hitherto been supposed.

The Eskimos say that the *tungavia* occurs throughout the length of the south coast from about White Strait to Gabriel Strait and is also to be met with in Frobisher Bay. The species is apparently wholly absent from the interior and the coasts of southwestern Baffin Island. Where now known to occur it appears to be much more common in the Lake Harbour district than elsewhere. The species probably has a more or less continuous breeding range in these parts along the coast from about Crooks Inlet to, and about, Frobisher Bay, and north into Cumberland Sound.

Lagopus lagopus albus (Gmelin) WILLOW PTARMIGAN.*—Eskimo: *Arkagevik.*—Though the writer collected a large series of Ptarmigan from many widely-separated localities in Baffin Island from 1923 until 1926, not a single Willow Ptarmigan was represented, all proving to be *rupestris*. The former had, however, been recorded by several other observers, including Kumlien and Hantzsch. The belief therefore gradually grew in the mind of the writer that the species was extremely rare, an elusive feature of the island's life that had apparently departed, not to return. Then on April 12, 1929, the writer came upon a flock of 16 Ptarmigan at Ungenuk Lake in the heart of Foxe Peninsula; three were collected and all proved to be *albus* males with the necks showing the first rusty-brown feathers of the spring plumage.

One of the greatest surprises of the season, however, was yet to come. No other Willow Ptarmigan were met with after the above incident until May 23, when travelling over the lowland near Bowman Bay, en route to Camp Kungovik, the party ran into an immense flock of these birds numbering several hundred individuals. Later in the afternoon another flock of 80 was passed, and at the night camp a group of over 100 strutted about and cackled with innocent stupidity. They appeared to take little or no notice of men and dogs and the bustle incident to a comparatively large party making camp for the night. Several were taken for the collection with a small rifle. The number of these attractive birds throughout this locality was astonishing and easily constituted one of the rarest and most interesting ornithological episodes to befall the writer in the Arctic regions. Subsequently a good series of specimens, which proved to be a new race,* was taken for the National Museum of Canada.

* In the annual report of 1930 (distributed April 4, 1932), National Museum of Canada, Mr. P. A. Taverner describes this bird in "A New Sub-species of Willow Ptarmigan from the Arctic Islands of America". The name proposed is the White-shafted Ptarmigan (*Lagopus lagopus leucopterus*, subsp. nov.) Type. Nat. Mus. of Canada, No. 24437, ♂. May 28, 1928. Camp Kungovik, west coast of Baffin Island, latitude 65° 35′ north, Collector, J. Dewey Soper.

Willow Ptarmigan visiting camp.

Upon establishing Camp Kungovik on May 24, many large flocks composed of both sexes were in view on the tundra a short distance away. Their favourite resort was the banks of the Blue-goose River, which were just beginning to emerge from the snow fields. Here they resorted in hundreds—doubtless thousands for the region—until nearly the middle of June. During this period flocks numbering from a few individuals, up to about 200, made a practice of sweeping in and alighting noisily at the camp. Here, so long as no one appeared, and quiet was maintained, the birds held high carnival. They walked briskly about the tents, under the guy ropes, pecked at the canvas, flew to the ridge-poles of the tents, and inspected boxes, cans, and the big canoe with consuming interest. The very existence of the camp appeared to be a magnet for their overwhelming curiosity. Throughout such raids the whole company maintained a running fire of conversation, while the males cackled with loud and brazen persistence. On such occasions it was commonplace to witness from 50 to 100 birds within a few feet of the tent, when their continuous vocal efforts flooded the camp with a wave of discordant sound. A series of good photographs was easily obtained by carefully "shooting" through a slit in the front flap of the tent, when individual birds were frequently within arm's reach.

The loquacious males of this species are possessed of a large and varied vocabulary. The familiar call is a deep, booming note,—*who--who-who,* or *how-who, how-who.* They sometimes cluck like barnyard fowls and emit many low sociable notes and mutterings. A frequent utterence is a rolling crescendo,—*tut-tut-tut-ta-ta-ta-ta-ta-a-a-a-aaaa-ooooo.* In general composition it is somewhat reminiscent of the drum-call of the Ruffed Grouse, but in this case the effect is produced entirely in the throat. This is evidently a real love song, as it was heard only in June. Upon alighting after flight the birds customarily utter a loud, confident cackle. Similar to contented domestic fowls, they give voice to various soliloquies, like—*kuck-kuck-kuck* and *how-it, uck-a-uck-a-uck-a-uck,* which are practised both while resting and feeding. The whole range of various expressions of this species is singularly deep and guttural, some of which may be heard to a considerable distance.

By June 12, the whole head and neck of the males had become a rich, dark rufous to rufous brown, while the wattles were greatly developed in a bright scarlet. Except for this, the white, winter garb was worn throughout June and well into July, when the summer plumage gradually appeared. In the case of the females, on the other hand, the change into summer dress had taken place by the last days of June.

The great abundance of Willow Ptarmigan was maintained around Camp Kungovik until nearly the middle of June when there began to be a pronounced decrease in the flocks and a tendency to segregation. By late June and early July the species had shrunk in numbers to such an extent that a walk of many miles on any day would not reveal more than three or four individuals. Near the Blue Goose breeding grounds the birds were not uncommon during the first week of July, where they resorted to the little areas of grassy uplands among the low, granite hummocks of the Eswituk ridge. Here the males exhibited a distinct predilection for well-defined "stands" as is characteristic of the grouse family. These stands were in the form of boulders, or isolated and relatively high grassy tussocks on the tundra, where the birds would perch for long periods. The presence of large quantities of droppings indicated clearly their purpose and use. Their loud, brazen cackling, as they descended and touched ground after flight was still characteristic,—it is probably indulged in throughout the year. Females were rarely seen at this time and were suspected of brooding, though long searching by every party failed to reveal a single nest. Unquestionably, however, the species breeds in this region.

During the latter part of July, Willow Ptarmigan were observed on only one occasion on the Bowman Bay plain. On the voyage along the south coast of Foxe Basin, from July 24 until August 12, not a single individual of the species was encountered. While crossing the Foxe Peninsula interior to Hudson Strait it was observered only once; this was a pair, with six young just on the point of flight, which was met with while making a portage below Crystal Lake on August 13. On the expedition of 1930-31, to the Lake Harbour region, this species was not observed, but the Eskimos report its occasional occurence during the migration; it is also stated that a few years ago a number of Willow Ptarmigan young were shot near White Strait. These are the only known breeding records of this species in Baffin Island.

(To be continued)

FOOD OF THE AMERICAN MERGANSER, (*Mergus merganser americanus*) IN BRITISH COLUMBIA

PAPER No. 2

By J. A. MUNRO

Chief Federal Migratory Bird Officer for the Western Provinces, National Parks of Canada, Department of the Interior, and

W. A. CLEMENS,

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IN A PREVIOUS paper* it was stated the Migratory Bird Service of the National Parks of Canada, Department of the Interior, and the Pacific Biological Station of the Biological Board of Canada have undertaken a study of the food habits of the American Merganser and the Red-breasted Merganser in British Columbia. The paper referred to summarized results obtained from the analyses of stomach contents of 157 American Mergansers taken on the coast and in the interior of British Columbia.

It was pointed out that most of the months of the year were represented by specimens but that there was a lack with respect to the spring months. This requirement has been met in part by the accession of 35 stomachs from specimens collected during March to June, inclusive, 1932. In addition to this there have been examined 33 other stomachs taken at other months of the year. It seems advisable to present these additional data at this time. Acknowledgement is again made to the Dominion Department of Fisheries through whose courtesy, and the valued co-operation extended by the officers of that Department, this material was made available. The authors wish to thank also Mr. R. T. Jackson, Vancouver, British Columbia, for specimens donated.

STOMACH CONTENTS OF 32 SPECIMENS FROM VANCOUVER ISLAND.

Goldstream

March 18, 1932 (1); 2 sculpins, approximately 55 and 90 mm., 1 *Salmo* sp. approximately 150 mm., 1 sand shrimp, *Upogebia pugetensis*, sculpin eggs in large quantity in throat and gullet.

Cowichan River

April, 1932, (2): Vertebral columns of 12 salmonoid fry, 3 caddis larvæ, 1 mayfly nymph 6 blackfly larvæ, 2 midge larvæ, and 2 small adult flies. The gullet of the second specimen contained fragments of a *Salmo* not less than 8 inches in length, the condition of the flesh suggesting that the fish had partly decomposed before being taken by the Merganser.

May, 1932, (2): One specimen contained the vertebral columns of 36 salmonoid fry, sculpin eggs, at least 3 caddis larvæ, mayfly nymphs, stone-fly nymphs and midge larvæ. The second contained 12 cc. of the insect remains comprising blackfly larvæ, midge larvæ and 1 caddis larva.

June, 1932 (1): Bone fragments of salmonoids and sculpins and several salmonoid fry.

September, 1932, (6): Sculpins found in 5, salmonoids in 3, terrestrial insects, including ants, in 1.

October, 1932, (2): Large number of small fish represented by scales and jaws with teeth, probably salmonoids; one specimen contained a lamprey, *Entosphenus tridentatus*, 70 mm.

December, 1932, (2): One specimen contained 96 salmon eggs, probably of Coho; one specimen contained a small amount of gravel, plant debris and unidentified fish bones.

Big Qualicum River

August 7, 1932, (3): Food items comprised 1 sculpin, *Leptocottus armatus;* shore crab, *Hemigrapsus oregonensis;* blue mussel, *Mytilus edulis;* and fragments of an unidentified gastropod.

Courtenay River

May, 1932, (3): One specimen contained sculpins exclusively, two contained sculpins and vertebral columns of salmonoid fry, in one case 15, in the other 18. Examination of the stomach contents from 2 of these sculpins revealed in one case 2 salmonoid fry and 6 crustacea, *Asellus;* and in the other 1 salmonoid fry, 2 midge larvæ and several small crustacea, Isopoda and Amphipoda.

Campbell Lake

May 25, 1932, (1): 1 sculpin, *Cottus asper*, 85 mm.; 1 stickleback, *Gasterosteus aculeatus*, 60 mm.; remains of at least 2 other small fish, one of which was a stickleback.

* *The Canadian Field-Naturalist*, 46: 166-168, 1932.

Tsable River

May 17, 1932 (1): Bones and eggs of sculpins and 1 caddis larva in case.

Puntledge River

May 10, 1932, (1): Vertebral columns of 2 salmonoid fry, at least 6 caddis larvæ in cases.

Henderson Lake and Henderson River

May, 1932, (4); Sculpins, *Cottus asper,* found in all four specimens; sticklebacks, *Gasterosteus aculeatus,* in one; salmonoid fry in three, in one case 61, in a second 24; insects, including blackfly larvæ, midge larvæ and mayfly larvæ, in three.

Marble Creek Canyon, Quatsino

June, 1932, (3): All of these contained sticklebacks, *Gasterosteus aculeatus.* Other fishes represented were smooth sculpin, *Leptocottus armatus;* blenny; perch, *Cymatogaster aggregatus,* and in one case fragments of two small *Salmo* sp.

STOMACH CONTENTS OF SPECIMENS FROM MAINLAND COAST

Capilano River

January 13, 1932, (1): 64 salmon eggs of which 7 were clear.

Squamish Flats

January 13, 1933, (1): 70 salmon eggs, opaque.

Owekano Lake and tributary streams

March, 1932, (1): Distended with decomposed salmon flesh.

April, 1932, (1): Several weathered salmon vertebrae that may have indicated an earlier feeding of decomposed salmon, but, on the other, hand, these bones may have been picked up with gravel.

May, 1932, (3): Contained vertebral columns of small fishes (the largest number being 6) in two cases identified as salmonoid fry; one stomach contained also 4 sculpins, *Cottus asper,* at least, and 1 caddis larva.

July, 1932, (8): These were all juvenals and contained sticklebacks, *Gasterosteus aculeatus,* the only other fish represented being sculpin, *Cottus asper,* two of which 35 and 60 mm. respectively, were in one stomach. All of these young birds had also taken quantities of vegetable matter, largely unidentified, and mixed with this were numerous insect fragments some of which material may have come from the stomachs of the sticklebacks.

December, 1931, (5): Four contained salmon eggs, and in one case 2 sculpins, *Cottus asper,* in another a beetle, had been eaten; one stomach was empty except for sand, gravel and vegetable debris.

There are 5 specimens for which dates are not available. The contents of these were:

1. Vertebral columns of 40 salmonoid fry, 1 *Salmo* sp. fry, 4 caddis larvæ.

2. Approximately 600 salmon eggs.

3. Sticklebacks, *Gasterosteus aculeatus,* fragment of salmon egg-case, insect fragments.

4. Sticklebacks, *Gasterosteus aculeatus,* at least 12.

5. 1 caddis larva in case, 1 salmonoid fingerling, fragments of at least 6 sculpins.

Gullchuck River

April, 1931, (6): Contained bones of fishes, including sculpins and 1 blenny. Shore crabs were represented in 3 stomachs. Another contained 7 shrimps. The collector, Fishery Inspector G. S. Reade, informs us that the migration of salmon fry was under way at the time these Mergansers were taken.

Quackusdis River

April, 1932, (5): Fishes represented were sculpin, *Oligocottus maculosus,* (in one case 11 whole fish and fragments of at least as many more sculpins), blenny, greenling, and in one specimen jaws with teeth suggesting salmonoids. Traces of shrimps, probably *Spirontocaris sitchensis* Brandt, were found in 3 specimens and one stomach was empty except for gravel.

Sand and gravel in varying amounts form a considerable percentage of the material in Merganser stomachs. Vegetable debris also is nearly always present, in the above cases including cedar twigs, madrona seeds, pieces of wood and unidentified debris.

The number of specimens for each month represented are as follows: January, 2; March, 2; April, 14; May, 15; June, 4; July, 8; August, 3; September, 7; October, 21; December, 7. Five additional specimens are not dated. The localities represented are Goldstream, 1; Cowichan River, 15; Big Qualicum River, 3; Courtenay River, 3; Campbell Lake, 1, Tsable River, 1; Puntledge River, 1; Henderson Lake and Henderson River, 4; Marble Canyon Creek, 3; Capilano River, 1; Squamish Flats, 1; Owekano Lake, 23; Gull Chuck River, 6; Quakusdus River, 5.

Food Items, tabulated.

Salmonoids (including *Salmo* and *Oncorhynchus* fry)	22
Salmon eggs	9
Decomposed salmon	1
Sculpins (including *Cottus aspcr*, 18; *Leptocottus armatus*, 2; *Oliogocottus maculosus*, 3; unidentified *Cottoids*, 8; eggs, 1)	32
Perch—*Cymatogaster aggregatus*	1
Greenling—*Hexagrammidae*	1
Blenny—*Blennidae*	3
Stickleback—*Gasterosteus aculeatus cataphractus*	19
Lamprey—*Entosphenus tridentatus*	1
Shore Crab—*Hemigrapsus oregonensis*	5
Shrimp—*Spirontocaris sitchensis*	4
Sand Shrimp—*Upogebia pugetensis*	1
Ant—*Hymenoptera*	1
Fly—*Chironomid* (larvæ and pupæ)	5
Blackfly—*Simulium* (larvæ and pupæ)	4
Fly—Misc. *Diptera* (adult)	1
Beetle—*Coleoptera*	1
Water Strider—*Hemiptera* (adult)	1
Water bug—*Corixid*	1
Caddis—*Trichoptera* (larvæ)	11
Mayfly—*Ephemerida* (nymph)	5
Stone-fly—*Plecoptera* (nymph and larva)	2
Insect fragments unidentified	10
Snail—*Mollusca*	1
Mussel—*Mytilus edulis*	1

A total of 225 American Merganser stomachs have been examined, the results of which present a fairly clear picture of the food range of this species in parts of British Columbia. Nevertheless, to complete this study more material is desired, both from the coast and the interior of the Province.

At the same time, it is evident that before conclusions are drawn as to the economic status of the American Merganser it is necessary to extend somewhat the field of enquiry. In the first place, the results of the studies of stomach contents of the birds have shown that the sculpin, *Cottus asper*, forms the largest single item in the diet. It is generally stated that sculpins are destructive to salmon and trout fry but the data are limited and accurate information as to the food habits of the sculpin should be obtained. So also it is desirable to enquire more fully into the food habits of the squawfish.

In the second place, close field observations should be made on the conditions under which Mergansers obtain salmon and trout fry and salmon eggs.

Finally, it is apparent that much additional information is desirable concerning the life history, distribution and numbers of the Merganser.

NUTRITIONAL ANAEMIA IN MINK

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AMONG the diseases of mink, which have come to our attention during the past few years, anaemia appeared to be more commonly met with than any other.

The symptoms appear to have been recognized under the somewhat loose and ambiguous terms of acidosis and sheath trouble, but the true nature of the disease does not appear to have been established. The term "sheath trouble" is descriptive of one of the common symptoms of anaemia in the advanced stages of the disease, but a degree of anaemia may exist without sheath trouble being apparent and the term is not applicable to the female. For these reasons the term is not satisfactory as applied to the disease in question as it does not give any clue to the true nature of the condition. The term acidosis is also open to criticism. Authorities on the subject are in no way agreed upon its real significance. Acidosis is not a disease in itself but is a complication which may exist in conjunction with a wide variety of diseases. Therefore, the use of the term in describing a definite and established disease in mink is not justified and should be dropped from the literature.

SYMPTOMS

A decline in the general welfare of the mink is the first noticeable symptom. The fur becomes brittle, harsh and dry and lacks the lustre, colour and sheen of the adequately fed animal. In the regions of the neck and tail the fur has a moth-eaten appearance and is also open and short over the back. A decline in weight takes

place as the disease progresses. Due to the constant dribbling of urine the sheath becomes wet, the abdomen bare of fur, and the skin inflamed. In advanced cases the penis protrudes and the sheath is swollen and tumour like. The eyes lose their bright beady appearance and become somewhat sunken in the head. As the disease progresses the mucous membranes, including the lining of the mouth and eye, become pale. The tongue has a blanched appearance and the foot pads are conspicuously white and bloodless. Shortly before death the mink may commence a nervous weaving movement with his head and body, the appetite fails and he becomes dull and sleepy. In these later stages the eye has a squinted look. Twitching of the legs accompanied with convulsions and gasping for breath is manifest. Finally the animal dies in a comatose condition.

CAUSES AND PREVENTION

In studies carried out at the Ontario Government Experimental Fur Farm it was found that the disease could be produced experimentally with regularity and certainty and that the symptoms and pathology were identical with the condition as it prevails on mink ranches. The outstanding feature from the pathologist's point of view is the presence of normoblast cells, and the irregularity in size of the red blood corpuscles in the blood stream. When found in any number normoblast cells are always indicative of anaemia, particularly the pernicious forms. In mink the red blood counts and hemoglobin may show a reduction as low as forty per cent. of the normal.

A large number of diets, considered adequate from the nutritional standpoint, have been fed on ranches where the condition has appeared from time to time. For example, the following rations produced the earlier symptoms of the disease, namely sixty per cent. fresh meat, consisting of beef hearts, tripe, and muscle meat, twenty-five per cent. cereals, ten per cent. bone meal, five per cent. vegetables and small quantitis of milk, wheat germ and yeast. A number of similar diets, all of which apparently contained a sufficient variety of food staples, did not give entirely satisfactory results. Where fish was substituted for meat, the condition also appeared.

It was not until the disease was recognized to be of anaemic origin that measures could be taken to prevent its occurrence. It was found that when small quantities of liver were added to the diet the anaemia did not develop The curative effect of small quantities of liver in the diet during the earlier stages of the disease was also noted. The addition of half an ounce of liver to the daily ration of a mink appears to be well within the necessary requirements.

In the experiments carried out the symptoms varied in severity according to the proportion of liver contained in the diet. Consequently, many mink are subjected to a state of nutrition fluctuating between satisfactory and unsatisfactory nutritional requirements. Severe symptoms terminating in death may very seldom be encountered, in some instances the disease going no farther than producing a somewhat dry and lustreless pelt and a slight dribbling of urine in a few young males. Notwithstanding the fact that the quality and denseness of the pelt may be affected to some extent the presence of a tendency to anaemia may not be suspected.

Once the disease has reached a severe stage treatment is of no avail, as pathological changes have taken place in the liver, lungs and kidneys which are beyond repair. It is only in the early stages that the addition of liver has a curative effect.

DISCUSSION

In this paper the underlying cause of the disease and the fact that liver is a preventive and curative in the early stages have been pointed out. There are, however, a number of questions which require further investigation For example, the proportion of cereal which a young mink can assimilate to advantage may possibly be connected with the proportion of liver in the diet. Young mink are usually fed a ration containing a high percentage of meat and fish, and such diets, though not necessarily adequate to offset anaemia, are superior to a high percentage of cereal in the ration. There is a possibility that the addition of liver to a ration containing a high percentage of cereals would supply the deficiencies which exist in these foods.

Further investigations will no doubt reveal the most satisfactory combinations of cereals, meat, fish and liver required for the optimum nutrition of mink.

POST MORTEM FINDINGS

The carcass is emaciated and upon opening the body cavities the tissues have a decided pallor. The large blood vessels stand out prominently. Their walls are thin and flabby and filled with watery, pale blood which does not clot readily. The intestines are thin, white and

blanched, containing little or no ingesta. The stomach and intestinal mucosa are usually coated with a rather thick gelatinous exudate. The liver has a mottled appearance varying from a light tawny orange to a dark chocolate brown colour. Small petechial hemorrhages are often present. The lobules may be quite prominent, especially near the borders of the lobes. The spleen is invariably swollen and dark brown to purple in colour. The kidneys are pale and swollen and frequently show light hemorrhagic areas. The heart is dilated and the musculature pale and flabby. The lungs are often edematous and congested. The body lymph glands are enlarged and frequently pale gray in colour.

Microscopic Pathology

The liver, kidney and lungs show the most pronounced pathological changes The blood vessels in all organs were only partly filled with blood, which stained poorly and was ill-formed. Many of the cells appeared shrunken and broken. The individual cells in most cases stained a pale pink to a yellow colour and a few stained a dark blue.

A granular appearance of some of the epithelial cells in the upper portion of the villi was the only significant change noted in the gastrointestinal tract. Small areas were observed where the cellular structures of the villi were destroyed to some extent. The cells appeared pale and frayed. The villi were often surrounded by mucin.

A pronounced and generalized infiltration of the liver cells was evident. In the lesser damaged areas the cells had a granular appearance. In the more extensively damaged areas the cytoplasm showed small, round, clear areas surrounding the nucleus, giving the cell a vacuolated appearance. These vacuolated spaces enlarged, forming one clear space in the cytoplasm, with the nucleus driven to the side of the cell. The capillaries were dilated. The sinusoides contained degenerated and poorly stained red blood cells.

Extensive damage took place in the kidney tubules. The cells lining the tubules were destroyed and lost their identity. The tubules appeared as enlarged clear spaces, surrounded by narrow ring-like bands of tissue. Blue staining deposits and casts were often present in the lumen of the tubules. The lungs were emphysematous with the characteristic structures of the alveoli destroyed.

PYCNOGONIDA FROM THE COAST OF BRITISH COLUMBIA

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THE PYCNOGONIDA have been a rather neglected group on the Pacific Coast of North America, particularly on the coast of British Columbia where up to the present there has not been a published record. In view of this fact, it is of interest and value now to place on record three species. Two were taken at Race Rocks, near Victoria, in the Strait of Juan de Fuca, by Mr. Sherman R. Burbank and forwarded to me for identification by Dr. W. A. Clemens, Director of the Pacific Biological Station, Nanaimo. The third was on file at the Biological Station and also forwarded by Dr. Clemens.

Phoxichilidium femoratum (Rathke)

Syn: 1799 — *Nymphon femoratum* Rathke, Naturh. Selsk. Skr. V, p. 201.

1837—*Orithyia coccinea* Johnston, Mag. Zool. Bot. I, p. 378, Pl. XII, fig. 4-6.

1842—*Phoxichilidium globosum* Goodsir, Edinb. New Philos. Journ., XXXII, p. 136.

1877 — *Phoxichilidium femoratum* Hoek, Niederl. Arch. f. Zool., III, p 240, Pl. XV, fig. 8-10.

1878—*Phoxichilidium maxillare* Wilson, Trans. Connect. Acad. Arts a. Sc. V, p. 12, pl. IV, fig. 1 a - c.

1878—*Phoxichilidium minor* Wilson, Ibid., p. 13, pl. IV, fig. 2 a - f.

One individual, a female, taken at Race Rocks, July, 1933, in a bed of goose barnacles. Mr. Burbank reports that several other specimens were seen but that this was the first time that this species was observed.

On the Pacific Coast, this species has previously been reported from Alaska (Cole 1904) and from California (Hilton 1915, 1918). Dr. C. McLean Fraser states that he has frequently taken

specimens in the Strait of Georgia, especially on good shrimp or general crustacean grounds. He also obtained one individual near Waldron Island in Washington Sound during the summer of 1931.

Phoxichilidium femoratum (Rathke) is also known from Eastern America, Greenland and Europe, from the White Sea to France and Ireland.

Pycnogonum stearnsi Ives

Syn: 1892—*Pycnogonum stearnsi* Ives, Proc. Ac. Nat. Sc. Philad. 1892, p. 142, Pl. X, figs. 1 - 4.

Two individuals, egg-bearing males, taken at Race Rocks, May, 1933. Mr Burbank states that this species is fairly abundant in the mussel beds. Specimens without eggs are usually found singly, while egg-bearers seem to occur in pairs. Individuals with eggs have been observed from May to September.

This species was described from San Diego, California (Ives 1892) and has previously been known only from California.

Nymphon grossipes mixtum (Krôyer)

Syn: 1844—*Nymphon mixtum* Krôyer, Naturh. Tidsskr. Copenhagen, I, p. 110.

1930—*Nymphon grossipes* var. *mixtum* Schimkewitsch, Faune U.R.S.S. Pantopodes, II, p. 416, figs. 107-109.

Five individuals, three egg-bearing males, one young male and one female, taken in Nanoose Bay, a few miles north of the Pacific Biological Station at Nanaimo (British Columbia), September 14, 1913. Dr. Fraser states that this species was very abundant.

The synonymy of *Nymphon grossipes mixtum* (Krôyer) is rather complicated. Many authors synonymize it with *Nymphon grossipes* (Fabricius) and *Nymphon glaciale* Lilljeborg However I consider that they are three varieties or subspecies of *Nymphon grossipes* sensu latissimo. I agree with Schimkewitsch (1930) in calling my specimens: *Nymphon grossipes mixtum* (Krôyer). They have exactly the same palp characteristics and the same proportions of tarsus and propodus.

Nymphon grossipes mixtum (Krôyer) is a circumpolar, arctic and boreo-arctic species. On the European coast it is found as far south as the Faroes, Scotland and Denmark On the Atlantic coast of America its southern limit is Cape Cod and Long Island Sound. It seems abundant all along the northern Siberian coast and on the Pacific is found as far south as the sea of Japan. Unknown from Alaska, this is the first time it is recorded from the Pacific coast of North America. Hilton (1915) reported four individuals of a *Nymphon* sp. from Laguna Beach, California. It may be they were the same species.

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A NEW MAMMAL RECORD FOR THE RIDING MOUNTAIN NATIONAL PARK LIST

By H. U. GREEN

ON AUGUST 9th, 1933, while engaged on beaver research and collecting small mammals in the Riding Mountain National Park, Manitoba, a specimen of the Gray Eastern Chipmunk, *Tamias striatus griseus* Means* (R. M. No. 156 ♂ T.L. 235 T.V. 97.H.F.33), was captured on the eastern escarpment of the Riding Mountain above Norgate in a deciduous area, recovering from a recent burn, where *Eutamias minimum borealis* was quite abundant. Every effort was made to secure further specimens in this locality, but without result

As I have collected small mammals in the Riding Mountain and north-central Manitoba for several years without previous field knowledge of this form, I worked the higher altitudes to the west and north with the object of taking sufficient specimens to make a representative

* Determined by Dr. R. M. Anderson, National Museum, Ottawa.

group of study "skins" for the Riding Mountain Park museum at Wasagaming. It was not, however, until the north shore of Clear Lake was reached, 20 miles to the west, that, on September 17th, 1933, a second specimen was collected (R.M.No. 229 ♀ T.L. 251.T.V. 102.H.F.34), this time in a dense spruce forest where again *Eutamias minimum borealis* was abundant. This location, too, was closely trapped for several days, but no further specimens were collected or seen.

Tamias striatus griseus Mearns may, therefore, be included in the list of "Mammals of the Riding Mountain National Park, Manitoba, (H.U. Green. *Can. Field-Nat.* 46:149, 1932) and it may be inferred, owing to its apparent scarcity, that the district about Clear Lake, Riding Mountain National Park, is about the north-western limit of its range.

NOTES ON THE ALEWIFE

By G. C. TONER

IMMENSE numbers of gaspereaux, or alewives, *Pomolobus pseudoharengus* (Wilson), have been present for years in Lake Ontario. They were noted by nearly all the authors who have studied the fish fauna of this lake. Periodically they die, in great numbers and come ashore to pollute the beaches. Wright (1891) mentions the difficulty of removing such a nuisance from the shore lines near the cities. C. W. Nash, Provincial Biologist, as recorded by Pritchard (1929), found it on many occasions in Toronto Bay. In the same paper Pritchard has summarised the knowledge of the fish as a member of the fauna of Lake Ontario. They are supposed to have been introduced in the early days of fish culture by error when the intention was to plant shad. This theory has been maintained throughout the literature but apparently never critically examined.

During the past few years the writer has taken the alewife in some of the lakes of the Rideau Canal system and the Gananoque river system in Leeds and Frontenac counties. Specimens from Red Horse Lake and Charleston Lake, Leeds, have been placed in the Royal Ontario Museum of Zoology. Others in the same institution were collected by Mr. E. O. Ebersole from Otter Lake, Leeds. They have been reported from Dog Lake and Loughboro Lake in Frontenac and the Beverly Lakes in Leeds. Other reports indicate that these fish have a much wider range than was previously noted.

These lakes vary in height above sea level. The lower lakes are over 280 feet and the upper lakes are about 450 feet, with the level of Lake Ontario given on the Government charts as 245 feet. Mill dams and navigation locks separate the various lakes. These are almost impassable to fish that are not strongly anadromous. They were built before 1832 in which year the canal was opened to traffic.

The theory that the alewife was planted in Lake Ontario by mistake would seem to be untenable when the present distribution is considered. The presence of the alewife in the higher lakes might be accounted for in several ways. If the fish were planted in Lake Ontario they may also have been planted in the Rideau Lakes. This is unlikely since very few plants were made in such areas in the early days, and no records of later plantings have been found. Another possibility is that they may have migrated through the locks of the canal to the upper lakes, and from there downstream to the lakes of the Gananoque River system which receives part of its flow from the Rideau system. As an example of this type of migration, Dymond (1932) says that it is probable that this species reached Lake Erie by way of the locks of the Welland Canal. In the spring of 1910 and 1911 many of these fish were found dead along the edge of the canal at Washburn. Here the waters are 45 feet above Lake Ontario with three locks intervening. They may have been migrating at that time to the higher waters of the region. The area has again been under observation since 1928 in connection with other fisheries studies but no alewives have been taken.

The last possibility is that the species may be native to the entire region. Formerly, Lake Ontario was much higher and covered the entire area of the Rideau lakes. If the alewife was present at that time, when the waters lowered it would be left behind, and where conditions were right, would remain as part of the native fauna. Koelz (1930) has shown that under similar conditions the fresh water herrings, *Leuc-*

ichthys artedi, have split into a number of subspecies. Thus, if the alewife is part of the original native fauna, one might expect that it would differ slightly from the alewife of Lake Ontario and both forms would differ from the forms of the Atlantic coast. Pritchard (1929) found slight differences between fish of this species from Lake Ontario and others from Nova Scotia. It would be interesting to make some measurements of the Rideau Lakes specimens and compare with the figures given by Pritchard. Definite knowledge of an interesting type would be gained and, while it might not settle the status of the species, would throw some light on a debatable question.

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ADDITIONAL CHRISTMAS BIRD CENSUS, 1933

WOOD BUFFALO PARK, ALBERTA, DECEMBER 26th, 1933.—9.30 a.m. to 3.00 p.m. Calm, bright sunshine, temp. from -28° to -35°; recent temperatures from -45° to -60°. Travelled by dog train from Rocky Point, Peace River, to 30th Base Line at Slave River. Distance covered on census, 20 miles.

Willow Ptarmigan, 5; Arctic Horned Owl, 1; Alaska Three-toed Woodpecker, 1; Canada Jay, 2; Northern Raven, 1; Long-tailed Chickadee, 2; Hudsonian Chickadee, 4; Pine Grosbeak (subsp.?), 2; Common Redpoll, 6. Total, 9 species, 24 individuals.—J. DEWEY SOPER.

COURTENAY, VANCOUVER ISLAND, B.C., DECEMBER 24, 1933.—9.30 a.m. to 4.00 p.m. Overcast but clear and still, no wind; temp. around 40°. Country under snow for previous two weeks. Mainly road, Courtenay to Comox, taking in river (from Sandwick boundary) and foreshore; from Comox along foreshore to commencement of Comox Spit. Including half mile on Little River Road and other short excursions. Country mainly open, cultivated, with woodland. About eight miles. Observers together most of time and on foot.

Lesser Loon, 10; Pacific Loon, 4; Red-throated Loon, 2; Hollboell's Grebe, 6; Horned Grebe, 9; Western Grebe, 250±; White-crested Cormorant, 2; Blue Heron (*Ardea herodias* (subsp.?)), 5; Common Mallard, 500±; American Widgeon (Baldpate), 700±; Canvas-back, 15; Scaup Duck (probably both Greater and Lesser), 475±; American Golden-eye, 150; Barrow's Golden-eye, 1; Buffle-head, 58; White-winged Scoter, 800±; Surf Scoter, 220; American Merganser, 18; Red-breasted Merganser, 8; Bald Eagle (subsp.?), 1; Black Pigeon Hawk, 2; Oregon Ruffed Grouse, 2; Pheasant (Ring-necked?), 40; California Quail, 20; Coot (sp.?), 46; Killdeer, 12; Wilson's Snipe, 3; Glaucous-winged Gull, 220; Herring Gull, 5; Short-billed Gull, 16; Belted Kingfisher (subsp.?), 2; Flicker (sp.?), 18; Pileated Woodpecker (subsp.?), 2; Harris's Woodpecker, 1; Jay (Oregon?), 1; Raven (sp.?), 50; Northwestern ("Fish") Crow, 300; Chestnut-backed Chickadee, 60±; Red-breasted Nuthatch, 11; Wren (*Nannus hiemalis* (subsp.?)), 7; Seattle Wren, 10; Robin (*Turdus migratorius* (subsp.?)), 35; Varied Thrush (subsp.?), 60; Hermit Thrush (Dwarf?), 4; Golden-crowned Kinglet (subsp.?), 11; English Sparrow, 3; Western Meadowlark, 11; Brewer's Blackbird, 1; California Purple Finch, 65; Hepburn's Rosy Finch, 1; Pine Siskin (subsp.?), 300±; Oregon Towhee, 34; Oregon Junco, 140; Fox Sparrow (subsp.?, perhaps more than one), 11; Song Sparrow (subsp.?, perhaps more than one), 67.

As well, several hundred Ducks in Bay too far off to identify. Total, 55 or 56 species (3 introduced), about 4805 individuals, plus unidentified Ducks.—THEED PEARSE, DAVID GUTHRIE.

NOTES AND OBSERVATIONS

WOULD A MUSKRAT ATTACK A PIKE?—It is a well known fact that pike, when they are large enough, will seize a muskrat in the water and make a hearty meal of it. But will muskrats, on the other hand, attack young pikes when they have the chance? A strange happening I witnessed leads me to ask the question. A companion and I were sitting on the bank of the Rivière Noire, some eighteen miles from St. Hyacinthe, Quebec, in the early days of October. It was already dusk, probably 7 p.m. We suddenly heard a great splash and saw a large muskrat that dived in a hurry and disappeared on seeing us. We attached no importance to the matter until my companion suddenly asked: "What is that, on the sand?" I looked where he pointed, almost at our feet, and noticed a small green pike, probably twelve inches in length, which lay motionless on the shore, his belly flat on the sand. He had his snout towards the water, about six inches from it, but did not move. Taking a handkerchief in my hand, so that the slimy creature should not escape from my fingers, I grabbed it firmly. It was quite alive, apparently in the best of health, and my friend took it home to eat. How did this fish get on the shore, and why did he not try to jump back into the water? Had he been chased by the muskrat, and was he still too frightened to return to his natural element? I have already seen pike jump out of the water and land on a river's bank, when chasing minnows, but in such a case they hastily make for home and dear life. On this particular occasion, the fish made no movement whatever and only reacted on realizing he was being caught. Would a muskrat eventually prey upon a pike?—HARRY BERNARD.

REGARDING THE ARKANSAS KINGBIRD.—In July, 1933, while in the village of Simpson, Saskatchewan, I had my first experience with Arkansas Kingbirds. While in Simpson, the owner of the livery stable asked me to identify these birds which were busily engaged in feeding their four young. He had been comparing their habits with those of our common or Eastern Kingbirds and had come to the conclusion that they were Kingbirds of some kind. After identifying them with the aid of Taverner's *Birds of Western Canada,* he informed me that a pair of these birds had been nesting in different places about the village for the past five years. This year's nest was behind an electric light transformer in front of the livery stable, the young having left the nest for a higher position on the wires.—THOMAS A. HARPER, Simpson, Saskatchewan.

NOTE ON THE WATER OUSEL, *Cinclus mexicanus.*—An observation which may be of interest to naturalists was made during the spring of 1931 while the writer was examining the runs of small salmon on Graham Island, the most northerly of the Queen Charlotte group, British Columbia. It was found that the fry of the pink salmon migrate only at night and in the daytime seek dark places beneath the bank or the bottom beneath the stones apparently as a protection against their many enemies. On the morning of April 18, a Water Ousel was seen to alight on a log and proceed to eat eight fry which were at the time about 1½ inches in length. Four of these the bird picked from the water from the shaded area behind the log. The remaining four he picked from beneath the rocks at the bottom of the creek. Although there were other small fish in evidence the Ousel was apparently satisfied and stopped eating. Later in the afternoon the same bird was seen taking another meal of seven fry. Several such observations on succeeding days convinced us that the Water Ousel does eat pink fry as a steady article of diet and that the number taken at one time is seven or eight.—A. L. PRITCHARD, *Pacific Biological Station, Nanaimo, B. C.*

A RED-EYED TOWHEE NEAR QUEBEC CITY.—On the morning of May 18, 1932, R. Meredith, Angus Graham, and I observed a male Red-eyed Towhee (*Pipilo erythrophthalmus erythrophthalmus*) in

brushy second-growth on the border of the Gomin Wood, within three miles of Quebec City. We first heard the bird singing, then heard its call several times, while it remained out of sight among the shrubbery. Finally it resumed its singing, and we found it perched conspicuously on a small tree. The sun was behind us, making light conditions excellent while we all observed the bird in detail, noting its striking and characteristic coloration for five minutes through x6 binoculars at a distance of about thirty feet, and making certain of the identification. This is a species with which I have been familiar for many years.

The late C. E. Dionne, in his well-known work, "Les Oiseaux de la Province de Quebec" (Quebec, 1906), recorded that Neilson saw a pair of birds of this species at Cap Rouge, about seven miles west of Quebec City, in the spring of 1879. I have seen no other record of the occurrence of the Red-eyed Towhee in that vicinity.—HARRISON F. LEWIS.

THE COLOUR OF THE BILL IN ROSEATE TERNS, *Sterna dougalli*.—Major Allan Brooks in the April, 1933, *Canadian Field-Naturalist* comments on the colour of the bill of the Roseate Tern as observed in a breeding colony in Nova Scotia, and states that "all authorities in American works had given the all black bill of this tern as its diagnostic feature when in breeding plumage." This is hardly the case, for Ridgeway, Coues, Baird, Brewer and Ridgeway, Chapman and Forbush all speak of the red base. Forbush says: "bill black, usually more or less red (vermilion) at base (often about .50 of upper mandible and .33 lower). Under Field Marks he says: "Bill largely black with red base." I also find that Howard Saunders in his *Manual of British Birds*, says, "Early in the breeding season the bill is orange at the base, but soon becomes chiefly or wholly black". W. H. Hudson in his *British Birds* says, "bill black, orange red at the base in the breeding season", and gives a coloured plate by Thorburn which shows nearly half the bill red at the base. Bonhote in his "*Birds of Britain*" says, "The bill in the breeding season is black."

Major Brooks states that in all the Roseate Terns he collected "the bills showed about half red, much as in the Common Tern." The bill of the adult Common Tern in my experience and in the description of authorities is predominantly bright red with more or less of the tip black, the very end being pale yellow.

Roseate Terns for some years have visited Ipswich Beach in many hundreds, if not thousands, especially after the middle of July, sometimes outnumbering the Common Terns. The Roseate is of course easily distinguished from the Common Tern by its long white tail and other marks, and by its distinctive call-notes. Their bills are at this time decidedly black, a good field mark, but on close examination a very little red can generally be seen at the base, a very different coloration, however, from that of the red bill with black tip of the Common Tern. Roseate Terns sometimes appear at Ipswich in May and I have watched them courting on the beach, but have noted no difference in the colour of their bills at this time.

On July 19 and 20 of this year (1933) I spent much time studying the large colonies of Roseate and Common Terns breeding at Penikese Island, Massachusetts. At this time nearly all the eggs had hatched and most of the young were able to fly. As to the colour of their bills, I quote from my notes written at the time. The adult Roseates nearly all showed red plainly at the base of their bills, sometimes as much as half red and half black or possibly a little more red in a few cases. Commonly there was less red than black, perhaps one-third red, as well as some with scarcely any red, and that near the commisure. One fine adult had a bill all black but it showed a faint yellowish tint near the nostrils. In some the bills looked all black, but it was much more common to have some red at the base. The bills of adult Common Terns were vermilion red with black tips, generally less than one-fourth of the bill in length. Young Roseate Terns had black bills and black feet and tarsi. Young Common Terns had straw-coloured or, sometimes, pink bases to their bills, the rest black; the legs pale flesh or straw-coloured. These birds were studied on the wing and close at hand on rocks or near their nests, and the nearly full grown young handled. We are certainly indebted to Major Brooks for calling attention to the large amount of red in some of the bills of Roseate Terns in the nesting season.—CHARLES W. TOWNSEND.

NORTHERN OCCURRENCE OF HOG-NOSED SNAKE IN ONTARIO.—On August 25th, 1929, while paddling with W. E. Saunders and E. M. S. Dale up a narrow channel which connects Nogonosh Lake with Smoky Lake in Parry Sound district, Ontario, we were surprised to come upon a Hog-nosed Snake (*Heterodon controtrix*) swimming leisurely across the channel. We lifted the reptile into the canoe and brought it ashore. It appeared to be quite normal and active, coiling and striking with the usual blowing sound. Apparently it had left the low-lying shore of the channel to cross to the higher rocky ground. Its length was about 24 inches. This is, I believe, a very northern occurrence for this species.—STUART L. THOMPSON.

THE MASSASAUGA (*Sistrurus catenatus*) IN WELLAND COUNTY, ONTARIO.—There is a very extensive bog, variously known as the "Huckleberry Marsh" and the "Big Peat Bog" lying about 3½ miles west of Port Colborne. This marsh has a sinister reputation locally as the home of rattlesnakes, which are apparently frequently seen and killed by huckleberry pickers. Mention of this place is made by Mr. W. J. Leroy in *The Canadian Field-Naturalist*, 44:20, 1930.

On June 12, 1927, the writer visited this bog and saw a small rattler only about 200 feet north of the highway. It was about 18 inches in length and was lying coiled on a tussock of grass. As it was approached it sounded its rattle and disappeared in the woods. This particular day was evidently a favourable one for observing snakes, being sunny, but with a cold wind. Within quite a small area several snakes were to be seen, sunning themselves on logs and tussocks. Near where the rattler had been seen were two large Milk Snakes and a Garter Snake. Under the log on which the Milk Snakes had been lying two more Garter Snakes were found. When these Milk Snakes were disturbed they vibrated the tips of their tails rapidly, making quite a loud sound.

The Marsh was explored, in company with Mr. Leroy, on August 15, 1928, but only one Garter Snake was found. However, the particular spot where I had seen the Rattler was inaccessible by road, which was under repair. On this occasion an American Egret was observed on the northern border of the marsh.

Professor W. T. MacClement, of Queen's University, and I revisited the exact locality where the first specimen had been seen and were fortunate enough to find another Massasauga in practically the same spot as that of five years previously. It was of about the same size, also. This snake was captured by holding it down with the handle of a butterfly net, while a quart fruit jar was slipped over its head and gradually closed behind the body. It was shown to Mr. Leroy at Toronto, who said that the light markings on the back were of a much more yellow tint than those of specimens from other parts of the province and that this seemed to be characteristic of those Massasaugas from Welland County, which he had seen. The specimen was eventually preserved at Queen's University Museum.—W. E. HURLBURT, *Vineland, Ontario.*

In a subsequent letter Dr. Hurlburt says:—"In regard to my observations on the Milk Snake vibrating its tail, contained in my article on the Massasauga, there is no doubt a noise was produced. This may have been from contact with grass, leaves, &c., but this long afterward I cannot recollect the exact position of the snakes when I heard the noise. When I first saw these snakes they were on a log. As I approached they went under the log and I turned it over and caught one of them. It may have been after I turned the log over that they vibrated their tails. Such being the case, there would no doubt be enough loose material near by for them to strike.—W. E. HURLBURT."—Ed.

ANOTHER BIRD-EATING FROG.—Mr. P A. Taverner's note in the November, 1933, *Canadian Field-Naturalist* recalls another instance to add to the collection of Frog notes:

On August 7, 1930, an immature Junco was found fluttering against the inside of a window in the Lake Mohonk Mountain House, Mohonk Lake, N. Y. It was banded and released but repeated six times in nearby traps during the next two weeks. On August 21 the attention of some of the guests was attracted by a commotion in a small stone-walled fountain pool in front of the Mountain House. Investigation showed it to be caused by the struggles of a frog which had

the head and neck of the above Junco in its mouth. The bird was dead. I did not see the struggle, but those who did said the frog was trying to swallow the bird at first, but later disgorged it. By the time that I arrived on the scene, the frog had disappeared, but it was probably a Bull Frog. The explanation offered at the time was that the bird either flew against some nearby windows and fluttered down into the pool or else fell in, in trying to get a drink.—DANIEL SMILEY, JR.

REVIEW

THE "C.J.N."—At the first meeting of the A.C.F.A.S. (Association Canadienne-Francaise pour l'Avancement des Sciences), one of the highlights was the exhibition of natural history collections of the C.J.N. (Cercles de Jeunes Naturalistes). We now have before us the November, 1933, number of the "Revue M.S.L." which is entirely devoted to a description of the exhibits and a brief history of the C.J.N.

This movement, which is barely three years old has swept through the schools of Quebec and enlisted a host of students in scientific research. Since its foundation, it has spread to Ontario, Manitoba, New Brunswick, Prince Edward Island, Alaska, Yukon and even Bengal. But the bulk of the membership is in Quebec where three hundred and twenty-six clubs are actively engaged in studying and collecting the flora and fauna of as many different parts of the province.

When one considers that these young people work under the watchful eye of such men as the Rev. Bros. Adrien and Marie-Victorin and Mr. Jacques Rousseau, it will be realized that important details (exact locality, date of collecting, formation, etc.), so often missing in amateur collections, will not be neglected.

And now, a word about the collections themselves. As might have been expected, the bulk of them are botanical, but there are small zoological, entomological, mineralogical and geolcgical exhibits. These promise well for the future and it is to be hoped that more and more time will be devoted to them, for these fields have been less thoroughly worked than has Botany.

Might a conchologist add that very little collecting of land and fresh-water shells has been done in Quebec? These shells are everywhere plentiful, require very little preparation and storage space, and are therefore deserving of more attention from amateur naturalists.

Even from the more than sketchy outline of the work of the C.J.N. given here, it will be seen that this movement is one of the most important in popularizing natural history in Quebec, and one to be watched and enjoyed by all Canadian naturalists—A. LA ROCQUE.

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The Canadian Field-Naturalist

VOL. XLVIII OTTAWA, CANADA, APRIL, 1934 No. 4

Marmota caligata broweri, A NEW MARMOT FROM NORTHERN ALASKA

By E. RAYMOND HALL and RAYMOND M. GILMORE
(Museum of Vertebrate Zoology, University of California, Berkeley, California)

IN THE YEAR 1928 when Mr. Charles D. Brower, of Point Barrow, Alaska, first began to build up, in the Museum of Vertebrate Zoology, a collection of mammals from northern Alaska (see Univ. Calif. Publ. Zool., *30* (No. 14), 419-425, he obtained one skull only of an immature Marmot from Cape Thompson. The skull presented certain features differentiating it from those of other American Marmots. Knowledge of this fact led Mr. Brower to make special efforts to obtain adult, and more complete, specimens from northern Alaska, since it was suspected that a heretofore unrecognized race existed there.

Mr. Brower was successful in this effort; he obtained three additional specimens, each a skin, skull, and skeleton, from Point Lay, just south of latitude 70°, on the Arctic Coast of Alaska. Study of this material shows that though the Marmot of northern Alaska is allied to the Hoary Marmot of northwestern North America, it, nevertheless, differs from any of the described races in both external and cranial features. Indeed, the striking black face, light-coloured underfur, black-tipped overhairs, often with a tawny suffusion on the back and flanks, make it one of the most handsome of American Marmots.

The name *broweri* is proposed as a token of recognition of Mr. Charles D. Brower, of Barrow, Alaska, whose industry in saving natural history materials has contributed so greatly to the forwarding of our knowledge of the fauna of northern Alaska.

Marmota caligata broweri, new subspecies

TYPE.—Adult, unsexed, complete skeleton with skin; No. 51675, Mus. Vert. Zool.; Point Lay, Arctic Coast of Alaska; collected in early December, 1931; obtained from native resident by Charles D. Brower.

RANGE.—Known definitely only from the type locality and the vicinity of Cape Thompson.

DIAGNOSIS.—A Marmot of the *caligata* group with black face and white feet. Remainder of coloration essentially as in *Marmota caligata broweri* (Eschscholtz) save for greater average tawniness on hinder back and flanks. Size apparently less than in *M. c. caligata*. Skull: relatively (to condylobasal length) narrow across zygomata; nasals narrowest at point one-quarter of their total length from posterior ends; palate projecting behind last upper molars; anterior palatine foramina constricted anteriorly; angular process of mandible projecting little if any behind articular process.

COMPARISON AND RELATIONSHIPS.—The large size, black and white coloration, and general shape of the skull clearly show the close relation of this Marmot to the *Marmota caligata* group. From *Marmota caligata caligata*, as known to us by Alaskan specimens from the Kenai Peninsula, localities bordering on Prince William Sound, Savage River in the Mt. McKinley District, and British Columbia material from the Stikine River at Flood Glacier, *M. c. broweri* is found constantly to differ in the following respects: face all black rather than marked by extensive white area between and in front of eyes; feet mostly white rather than black or blackish brown; skull relatively narrower across zygomata; posterior two-thirds of nasals in longitudinal axis relatively straight rather than convex dorsally; nasals constricted, and narrowest, medially rather than tapering posteriorly; nasals extending farther posteriorly to premaxillae; palate projecting farther posteriorly to plane of last upper molars; anterior palatine foramina constricted anteriorly rather than posteriorly; inferior margin of

lower mandible relatively straight rather than distinctly concave (mandible markedly deeper below $\overline{M2}$ and $\overline{M3}$); angular process reduced and projecting little if any, rather than far, posteriorly to articular process.

If the type specimen, a fully adult animal, is a male, as is suspected on account of the lack of well-developed mammae, then *broweri* is judged to be a smaller animal than *M. c. caligata*.

MEASUREMENTS.— Selected measurements, in millimeters, of the skull of the type specimen, probably a male, are as follows: condylo-basal length, 94.9; palatal length, 55.2; postpalatal length, 35.0; length of nasals, 40.1; zygomatic breadth, 61.6; breadth across mastoids, 41.7; least interorbital breadth, 24.0; breadth of rostrum, 21.8; maxillary tooth row 21.0.

REMARKS.—Since practically every one of the comparative differences mentioned above constantly distinguishes *M. c. broweri* from *M. c. caligata*, the only described subspecies whose geographic range adjoins that of *broweri*, it might be maintained with some justice that *broweri* should be accorded full specific rank. However, the differences distinguishing the two forms are of much the same nature as those which distinguish other subspecies, of the *caligata* group, between which intergradation has been found to exist. Also, Marmots are known to occur in several parts of Alaska which are geographically intermediate with respect to the ranges as now known of *M. c. caligata* and *M. c. broweri*. Nelson, in his *"Report upon the Natural History Collections made in Alaska between the years 1877 and 1881"* (No. III, Arctic Ser. Publ., Signal Service, U.S. Army, 1887, p. 282) reports that "At Kotzebue Sound I saw a great many of their skins made up into clothing and worn by the Eskimo from the headwaters of the Kowak and Nunatog Rivers. The people reported them to be abundant there among the hills in about latitude 68°." Also, in their *"Notes upon the mammals of northwestern Alaska"* Bailey and Hendee (Journ. Mamm., 7:20, 1926) state that: "Marmots are fairly common throughout the hills of northern Alaska. The Eskimos told us they were numerous 50 miles inland from Wainwright. They are found in the foothills of the Endicott Mountains inland from Kotzebue Sound, and in the hills back of Nome." Whether or not Marmots from these mentioned localities are referable to *M. c. broweri* or even to the species *Marmota caligata*, we have no way of knowing. It is barely possible that *Marmota monax* occurs at some of the mentioned localities. However, we think it probable that intergradation will be found to exist between *M. c. broweri* and *M. c. caligata*.

No external measurements were taken of the specimens in the flesh. The prepared skeleton of the type specimen has the caudal vertebrae intact. The vertebrae, 21 in number, posterior to the pseudosacrum (two caudal vertebrae fused with the two sacral units) measure 190 millimeters in length. The hind foot measures 80 millimeters on the dried skin. If we are correct in supposing that the absence of well-developed mammae upon the skin of the type specimen marks it as a male, then the measurements indicate that *broweri* is a smaller animal than *caligata*, for even if an allowance of five per cent for shrinkage due to drying is made for the type it still is smaller than any adult male of *caligata* seen, or of which Howell (*N. A Fauna*, no. 37, p. 60) gives measurements.

With respect to the taking of the type at a time as late as December, Mr. Brower, under date of January 29, 1932, writes: "This one was taken in the early part of December; somewhat late for him to be wandering around. Mostly, they disappear in early November."

Two of the three specimens from Point Lay are young; the temporal ridges have barely fused posteriorly. The skull-only from Cape Thompson is that of a subadult. However, despite the tender age of these specimens, each one of the three displays the characters mentioned above as distinguished *broweri* from *caligata*.

SPECIMENS EXAMINED.—Total number, 4; all from the Arctic Coast of Alaska; Point Lay, 3; Cape Thompson, 1.

It seems appropriate to record here a slight extension of the known range of *Marmota caligata raceyi*. This marmot, recently named as new by Dr. R. M. Anderson (Ann. Rept., for 1931, Nat. Mus. Canada, p. 112, 1932) from the Chilcotin Plateau, latitude 52° 45' north, longitude 125° west, was based on eight specimens obtained at the mentioned locality by Mr. Kenneth Racey in 1931. Roughly one year later, on May 30, 1932, Mr. Thomas T. McCabe and Mrs. Elinor Bolles McCabe, obtained an additional specimen (No. 52111, Mus. Vert. Zool.) of the Chilcotin Hoary Marmot at a point 30 miles east of Bella Coola. This locality is near 55 miles southwest of the

type locality of *M. c. raceyi*. Nevertheless, the specimen displays the same narrow skull and black and white pelage characterizing topotypes of *raceyi* and suggests that the subspecies has a more extensive geographic range in southwestern British Columbia tha the two records of occurrence now show.

Transmitted November 6, 1933

LEGENDS FOR FIGURES

Views of the skulls and left lower jaws of two subspecies of *Marmota caligata*. Drawings are photographically accurate. Outlines were made on photograph; photograph then washed out. Figures ½ natural size.

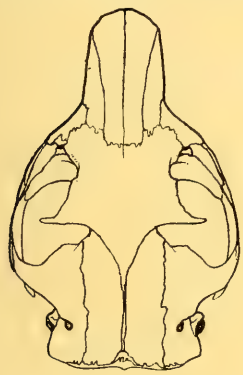
Fig. 1. *Marmota caligata broweri* adult, male ? No. 51675, Mus. Vert. Zool., type specimen; Point Lay, Arctic Coast of Alaska; collected in early December, 1931; obtained from native by Charles D. Brower. Dorsal view of skull.

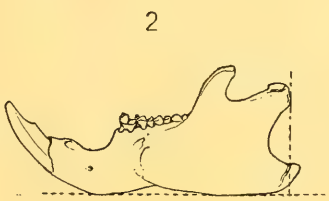
Fig. 2. *Marmota caligata broweri*, lateral view of left lower jaw, belonging to same skull shown in fig. 1.

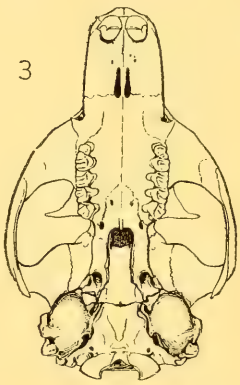
Fig. 3. *Marmota caligata broweri*, ventral view of same skull shown in fig. 1.

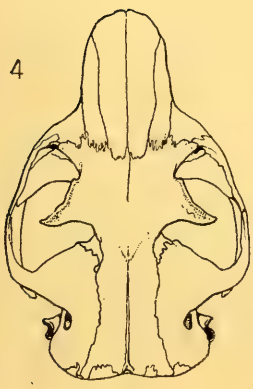
Figs. 4 to 6. *Marmota caligata caligata*, adult, male, No. 964, Mus. Vert. Zool.; Hinchinbrook Island, NE Bay Mt., 1500 ft., Prince William Sound, Alaska; June 27, 1908; collected by Edmund Heller. Views corresponding to those shown of *M. c. broweri*.

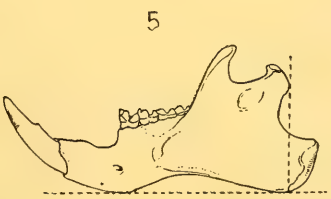
Note especially as between *broweri* and *caligata*, difference in shape of the nasal bones; difference in shape of the anterior palatine foramina; longer palate, and smaller angular process of the lower mandible and more nearly straight inferior margin of lower mandible in *broweri*.

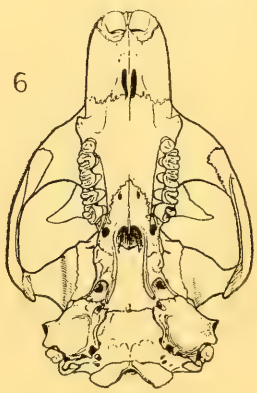


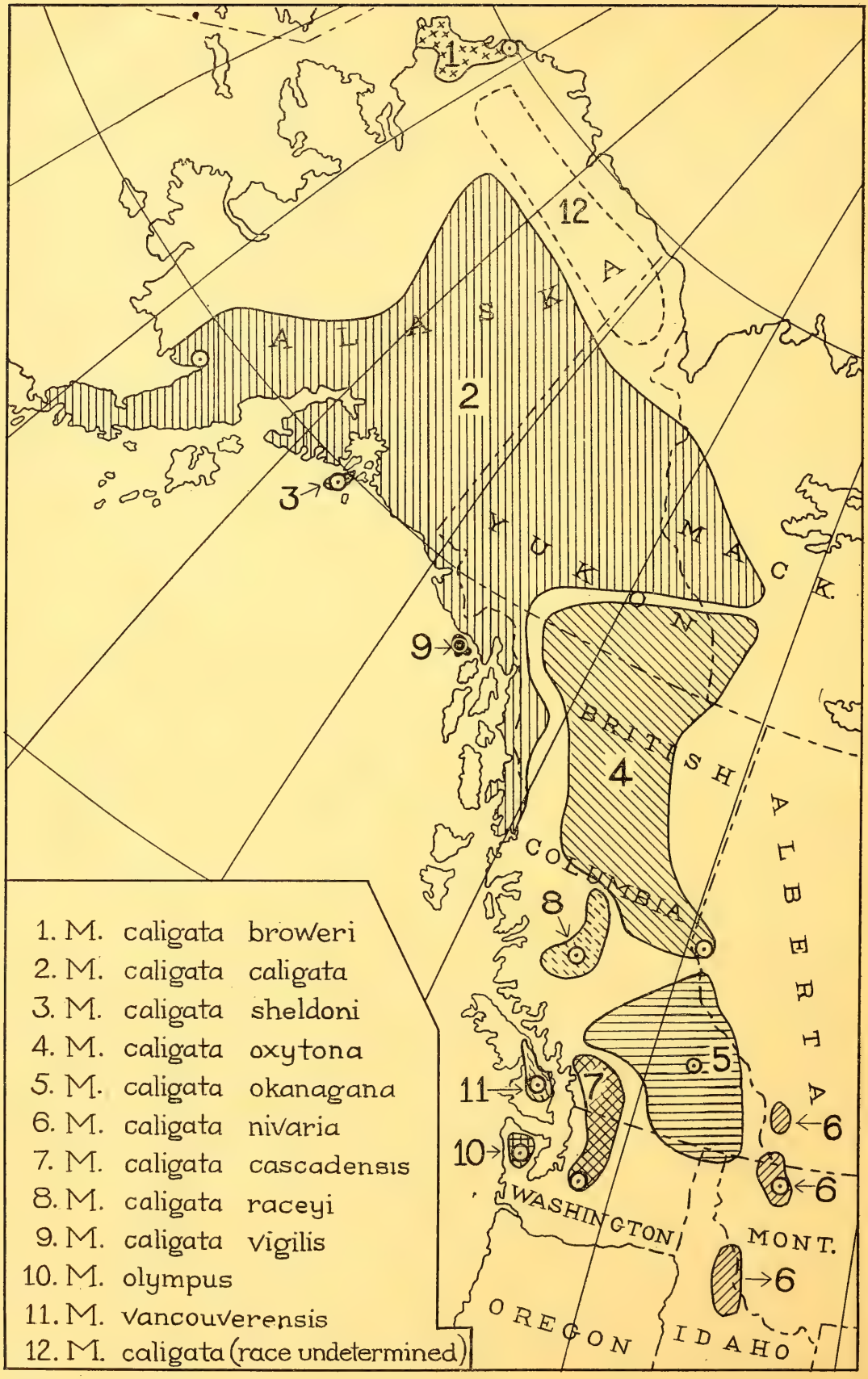











1. M. caligata browerí
2. M. caligata caligata
3. M. caligata sheldoni
4. M. caligata oxytona
5. M. caligata okanagana
6. M. caligata nivaria
7. M. caligata cascadensis
8. M. caligata raceyi
9. M. caligata vigilis
10. M. olympus
11. M. vancouverensis
12. M. caligata (race undetermined)
ALASKA
YUKON
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BRITISH COLUMBIA
ALBERTA
WASHINGTON
MONT.
OREGON
IDAHO

NOTES ON THE DISTRIBUTION OF THE HOARY MARMOTS[1]

By R. M. ANDERSON

THE DESIRABILITY of publishing a revised map of the distribution of the Hoary Marmots or "Whistlers" of the *Marmota caligata* group was suggested to the writer by Dr. E. Raymond Hall, Curator of Mammals, Museum of Vertebrate Zoology, University of California, Berkeley. The latest map showing the ranges of the different forms of this group is in Mr. A. H. Howell's "*Revision of the American Marmots*" in 1915[2], reproduced without change by Mr. H. E. Anthony in 1928[3].

Since that time the writer has described a new subspecies from the interior plateau region of British Columbia, *Marmota caligata raceyi* Anderson[4], and Hall and Gilmore have more recently described another new subspecies from northwestern Alaska (see *ante.*) A considerable number of additional specimens of several forms have also been obtained from various localities in the region and a number of additions and corrections can be made to the 1915 map.

The Hoary Marmots are essentially upland inhabitants, living near timber-line in the mountains, or in the vicinity of rock-slides and talus slopes where they may find shelter in connection with sufficient food. While the species (*Marmota caligata*) is quite generally distributed in the northwestern mountain regions, the ranges of the forms are by no means continuous as Marmots may be absent from the valleys or from mountain areas where conditions are not suitable. Considerable collecting and study will be necessary in the future before the numerous gaps in our map are filled and the points of contact or intergradation of the races are demonstrated.

The Northwestern Hoary Marmot, *Marmota caligata broweri* Hall and Gilmore, is based on 4 specimens from Point Lay and Cape Thompson on the northwestern coast of Alaska. When I was working in Arctic Alaska in 1908-1909 and 1913-1914, I heard many reports of Hoary Marmots from various points along the northern slope of the Endicott Mountains, and saw at least one skin from Hula-hula River in the foothills south of Barter Island, and other parts of skins in the possession of Eskimos. They were known to the white traders as "badger" and to the Eskimos as *Tjik-tjik-puk* or *Sik-sik-puk* (meaning "big ground squirrel" = big *Citellus parryii*), the native diagnosis of its relationship being much nearer the truth than that of the whites. Some of the Eskimos showed me where they had taken specimens of the animal on the Hula-hula River, but it was too late in the autumn to get any specimens of the hibernating Marmots. There is certainly a large area in the Endicott Mountains (indicated by dotted range No. 12 on the accompanying map) where Marmots certainly occur, but until specimens are brought out from this area it is impossible to say whether the Hoary Marmots of the region belong to *M. c. broweri*, or whether the range of typical Northern Hoary Marmot, *Marmota caligata caligata* (Eschscholtz), extends northward from the Yukon valley side to the foothills on the north slope of the mountains. It is quite probable that the Marmots do not range as high on the mountains here as they do farther south, as the mountain-tops (from 3,000 to 8,000 feet) are rather barren and Arctic-Alpine conditions, as shown by the flora, extend practically to sea-level on parts of the Arctic coast.

The Chilcotin Hoary Marmot, *Marmota caligata raceyi* Anderson, was described from 8 specimens obtained on Itcha Mountains, Chilcotin Plateau, by Kenneth Racey in 1931. Hall and Gilmore (see *ante*) report one specimen taken in 1932 at a point 30 miles east of Bella Coola, 55 miles southwest of the type locality of *raceyi*. The National Museum of Canada recently received a fine male specimen taken by Mr. John C. Shelford, June 16, 1933, near Burns Lake (a little south of Babine Lake, B.C.), extending the range of *raceyi* to about 120 miles nearly north of the type locality and making a small indentation into the southwestern boundary of the formerly assumed range of the Robson Hoary Marmot, *Marmota caligata oxytona* Hollister. My correspondent informed me that while the Hoary Marmots had been reported in the neighbouring mountains, this was the first one that had been

[1] Published with the permission of the Acting-Director, National Museum of Canada, Department of Mines, Ottawa

[2] North American Fauna, No. 37, Bureau of Biological Survey, U. S. Dept. of Agriculture, Washington, 1915. Fig. 3, p. 58.

[3] Field Book of North American Mammals, G. P. Putnam's Sons, New York—London, 1928. Fig. 47, p. 191.

[4] Annual Report, 1931, National Museum of Canada, 1932, pp. 112-119, Plate V.

known to wander down to low levels, and it was taken in a small house where meat was stored. Two specimens (one melanistic) of the British Columbia Woodchuck, *Marmota monax petrensis* Howell, were taken near the same place. *M. m. petrensis* is known to occur within the range of *M. c. okanagana* farther to the south-east, and the Yellow-bellied Marmot, *Marmota flaviventris avara*, occupies a similar relationship to *okanagana* in the drier valleys farther west.

In studying the range of the Cascade Hoary Marmot, *Marmota caligata cascadensis* Howell, I found seven records given by Howell (1915, p. 69) of British Columbia localities, namely: Chilliwack, 1; Hope, 1; Howe Sound (near head), 3; Mount Baker range (near U.S. Boundary), 8; Skagit River (mountains near head), 6; Spence's Bridge, 1; Tammi Hy (Tamihy) Mountain, 2; and that all these records are from the west slope of the Cascade mountains except Howe Sound (a little north of Vancouver) and Spence's Bridge, a station on the main line of the Canadian Pacific Railway on the south bank of Thompson River about 30 miles north-east of the junction of Fraser and Thompson rivers. As there are apparently no other British Columbia records of *cascadensis* on east side of Coast or Cascade mountains, and as the Spence's Bridge record is some distance from any other records of this subspecies, I thought it deserved further investigation. The specimen (No. 20798, A. M. N. H.) collected by James Teit, in 1903, was received on loan through the courtesy of the American Museum of Natural History and proved to be a medium-sized subadult, in faded and worn summer pelage, unsexed, and without skull. It resembles all of our 14 specimens of *M. c. okanagana* in having less blackish on head than any of our 13 specimens of *cascadensis*. Some of the specimens being juveniles in poor coats, the comparisons cannot be very detailed. Even with fairly good skins of adults in good pelage it is often quite difficult to separate specimens of *cascadensis* from *okanagana* with certainty, as there is considerable variation in the colours, and for a satisfactory determination the skull of the specimen is almost necessary. With only a skin in the condition of the Spence's Bridge specimen, it does not seem justifiable to list it as certainly *cascadensis*. In my opinion the general resemblance is somewhat closer to *okanagana*, and this opinion is strengthened by the occurrence of *okanagana* at McGillivray Creek, some 30 or 40 miles north west of Spence's Bridge. The best solution of the problem seems to be to treat the specimen as intermediate or indeterminable, and cut down the northward extension of the range of *cascadensis* as shown in Howell's 1915 map, leaving the space to be filled when more specimens from the region in question are available for scientific study. The National Museum of Canada obtained 2 specimens of *cascadensis* from Lihumitson Park, near the U.S. Boundary, in 1927, and specimens secured by Mr. Kenneth Racey and Mr. Ian McTaggart-Cowan of Vancouver indicate that the large indendation in the range of *cascadensis* on western side of Howell's 1915 map may be filled in.

The range of the Okanagan Hoary Marmot, *Marmota caligata okanagana* (King), as mapped by Howell (1915, p. 58) on the basis of the following specimens: (ALBERTA: Henry House (mountains 15 miles south), 2; BRITISH COLUMBIA: Field, 2; Glacier, 7; Spillimacheen River, 3; Toad Mountain (6 miles south of Nelson, 4), is too narrow and does not extend far enough to the westward. In his description of *okanagana* (1915, pp. 64-66) he discusses the original description by King [1] and fixes the type locality as "Gold Range, British Columbia,"—"the first range to the eastward of Shuswap Lake—where it is likely the type was secured" (Howell, 1915, p. 66). King (*ibid.*, 241) defines the type region as follows: "In a small tract of country, on the borders of the Rocky Mountains, lying between the Columbia and Fraser Rivers, these animals are found in abundance, supplying with food and clothing the Okanagan Indians, whose territory is bounded to the north by the Seechwap Lake, and to the south by the Spokane River . . ." Dr. H. S. Bostock and Dr. C. E. Cairnes of the Geological Survey of Canada, who are familiar with southern British Columbia, state that while "Gold Range" is not given on recent maps, in some of the older works "Gold Range" was practically synonymous with the present "Monashee Range" which consists of a group of small ranges. At one time the name "Gold Range" was applied to the range now known as "Shuswap Range." and this may properly be considered as the type locality, as fixed by Howell, although his map of the range of *okanagana* hardly comes that far west.

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1 Narr. Journ. Shores Arctic Ocean, Vol. 2, 1836, p. 236.

In the collection of the National Museum of Canada are 6 specimens from Banff, Alberta (Cascade Basin, 7,000 feet altitude), which may be referred to *okanagana*, also 6 British Columbia specimens taken farther west than any of Howell's records—4 from Rossland Group of Monashee Range, near Rossland, B.C. (Green Mountain and Old Glory Mountain, 6,000 and 7,000 feet altitude) at edge of Columbia valley a few miles north of Stevens County, Washington; and 3 specimens from McGillivray Creek (5,500 to 6,000 feet altitude), near Lillooet, which extend the range of *okanagana* much farther west, including some country rather close to the northern end of the range of *cascadensis* as mapped by Howell in 1915.

The Montana Hoary Marmot, *Marmota caligata nivaria* Howell, is mapped by Howell as inhabiting two separate regions: IDAHO: Bitterroot Mountains (headquarters of Clearwater River), 3; Elk Summit, Salmon River Mountains, 2; MONTANA: Upper St. Mary's Lake (mountains near), Glacier National Park, 9. The National Museum of Canada has one additional specimen taken on Mount Forget-me-not, about 40 miles WSW of Calgary, in southwestern Alberta (No. 452, female, July 10, 1897, Wm. Spreadborough collector), which is clearly referable to *nivaria* and may be cited as the first Canadian record of this subspecies. As large white Marmots are also reported from near timber-line near the western border of Waterton Lakes National Park, Alberta, just north of the border of Glacier Park, there is little doubt that these also belong to *nivaria* as well and that *nivaria* also occurs on the British Columbia side of the mountain passes in that region.

The range of the Vancouver Island Marmot, *Marmota vancouverensis* Swarth, which although of uniformly brown colour, is clearly related to the mainland species of the *Marmota caligata* group, was recorded by Howell (1915, p. 72) from Eagle Basin, 1; King Solomon Basin, 3; and Mount Douglas, 7. The known range of this species is now known to extend farther north on the eastern side of Vancouver Island on the strength of 5 specimens from Green Mountain, Nanaimo River, secured by Mr. Kenneth Racey in 1931, and one specimen taken by Mr. Arthur Peake on Battle Mountain in 1929 and presented to the National Museum of Canada by Major Allan Brooks.

The accompanying map is based on Howell's map "Distribution of the *Marmota caligata* group (1915, p. 58), with additions of the range of *M. c. broweri* by E. Raymond Hall; to the ranges of *M. c. raceyi* and *M. vancouverensis* by E. Raymond Hall and R. M. Anderson; and revision of the ranges of *M. s. cascadensis*, *M. c. okanagana*, *M. c. oxytona*, and *m. c. nivaria*, as well as of the range of undetermined form in Arctic Alaska by R. M. Anderson.

National Museum of Canada, Ottawa.

MAP.—Distribution of the *Marmota caligata* group, as revised by R. M. Anderson and E. Raymond Hall, 1934. Type localities shown by circle and dot. (See page 60).

SOME ADDITIONS TO THE VASCULAR FLORA OF ANTICOSTI ISLAND[1]

By J. ADAMS

IN THE 9th edition of the "Encyclopaedia Britannica" Anticosti is described as "a barren island situated in the gulf St. Lawrence". The same statement is repeated in the "Encyclopaedia Americana" and might have been written by one who viewed the island far out from the deck of some passing steamer. But is is very wide of the mark as experienced during a visit by the present writer in August, 1933. At this date many pretty plants were in full bloom such as the Harebell—the bluebell of Scottish song (*Campanula rotundifolia*), Grass of Parnassus (*Parnassia caroliniana*), Lady's Tresses (*Spiranthes Romanzoffiana*) an orchid with pure white, sweetly scented flowers, Smooth Camas (*Zygadenus chloranthus*) a bulbous plant with tall branching inflorescence composed of greenish-white flowers, and various others too numerous to mention. Of special interest to the dweller in the far inland was a group of sea-coast plants including the Beach Pea (*Lathyrus maritimus*), Sea Lungwort (*Mertensia maritima*) with its peculiar bluish leaves, and Sea Ragwort (*Senecio Pseudo-arnica*) with stout stem and heads of bright yellow flowers.

[1] Contribution No. 391 from the Division of Botany, Experimental Farms Branch, Department of Agriculture, Ottawa, Canada.

Various other plants were in fruit such as the Cloudberry or Baked-apple Berry (*Rubus Chamaemorus*) with salmon-coloured cluster of fleshy fruits, the Creeping Snowberry (*Chiogenes hispidula*) the pure aromatic berries of which were mostly hidden beneath the crowded leaves, several species of Blueberry (*Vaccinium*) just beginning to ripen, and the Trailing Cranberry (*Oxycoccus palustris*). But perhaps the most striking object was the Bunchberry (*Cornus canadensis*) whose scarlet fruits occurred in endless profusion on the cleared ground.

An interesting sight was the presence of deer, black foxes, and wild geese almost within a stone's throw of the observer. The tameness of the animals is doubtless due to the fact that no dogs are permitted on the island. Plenty of suitable habitats for these animals occur, such as lakes and swamps and extensive areas covered by timber of commercial size consisting principally of white spruce and balsam. Various species of grasses and sedges, pondweeds, and water lillies were plentiful.

In area the island is considerably larger than Prince Edward Island but belongs to a different geological formation, the underlying rock being calcareous in nature and highly fossiliferous. According to the latest topographical map (1929) issued by the Department of the Interior the centre of the island is for the most part still unsurveyed. Although no heights are marked on this map or on that contained in Dr. Schmitt's monograph in all probability the greatest elevation does not exceed 1000 feet.

My visit was made in response to a request from the Consolidated Paper Corporation, Limited, the present owners of the island, for the purpose of determining what were most suitable plants for the feeding of Muskrats and whether some other species not indigenous to the island might be introduced for the purpose. The area covered during the short time at my disposal embraced only the western end of the island extending from Baie Ste. Claire to Lake Simonne at the end of the logging railway. A considerable number of plants were collected some of which had not been recorded previously as occuring on the island.

A list of the fauna and flora so far as known at the time of publication is contained in Dr. Joseph Schmitt's "*Monographie de l'Ile d'Anticosti*" published in Paris in 1904. In this work a total of 467 species of vascular plants (seed-plants, ferns, horsetails, lycopods and their allies) are enumerated under their respective families.

The additions in the present list are similarly grouped under their proper families. Those marked with an asterisk are introduced species which doubtless found their way to the island in the form of hay or other imported material. As the island is apparently not divided into townships it is frequently difficult to indicate with precision the exact locality where some of the species occurred.

POLYPODIACEÆ

Onoclea sensibilis L. Whitehead Lake.

GRAMINEÆ

Ammophila arenaria Link. Shore of Ellis Bay.
**Arrhenatherum latius* Beauv. Port Menier.
**Bromus inermis* Leyss. Port Menier.
**Poa annua* L. Port Menier.

CYPERACEÆ

Eriophorum viridicarinatum Fernald. This was probably recorded previously as
E. polystachion L.
Scirpus validus Vahl.
Probably recorded previously as
S. lacustris L.

LEMNACEÆ

Lemna minor L. Anse aux Fraises.

JUNCACEÆ

Juncus articulatus L.

RANUNCULACEÆ

Ranunculus reptans L. Shore of Lake Simonne

CRUCIFERÆ

**Thlaspi arvense* L. Port Menier.

LEGUMINOSÆ

**Medicago lupulina* L. Port Menier.

ŒNOTHERACEÆ

Epilobium lineare Muhl.

HALORRHAGACEÆ

Myriophyllum sp. Washed up on the shore of Lake Simonne but too fragmentary to determine the species.

UMBELLIFERÆ

**Carum Carvi* L. Port Menier.
Cicuta bulbifera L. Whitehead Lake.

LABIATÆ

Scutellaria galericulata L. Lake Plantin.

PLANTAGINACEÆ

Plantago Rugelii Dcne. Port Menier.

RUBIACEÆ

Galium triflorum Michx. Port Menier.

COMPOSITÆ

**Artemisia biennis* Willd. Port Menier.
**Matricaria suaveolens* Buchenau. Port Menier.
Senecio aureus L. Whitehead Lake.
Erigeron philadelphicus L. Port Menier.
Solidago flexicaulis L.
**Cichorium Intybus* L. Port Menier.
Prenanthes altissima L. Baie Ste. Claire.

There are two species of plants which have proved to be a scourge to certain members of the human race and which have not so far been encountered on the island. These are Poison Ivy (*Rhus Toxicodendron* L.) and Common Ragweed (*Ambrosia artemisiifolia* L.)

Four species which do not occur naturally in Anticosti were introduced during the year 1933 on some of the swamps inhabited by the muskrats. These were Wild Rice (*Zizania aquatica* L.), Nut Grass (*Cyperus esculentus* L.), Broad-leaved Arrow-head (*Sagittaria latifolia* Willd.) and Sweet Flag (*Acorus Calamus* L.). It remains to be seen whether any of these will survive and become permanently established.

INTERESTING BIRD RECORDS FOR SOUTHERN BAFFIN ISLAND

By J. DEWEY SOPER

(*Continued from page 44*)

Crex crex (Linnaeus). CORN CRAKE.—A solitary male Corn Crake was collected on the beach at Dorset Harbour on September 24, 1928. This is the first record for Baffin Island, or the Canadian Arctic regions. This individual was very thin and barely capable of sustained flight. The bird was not known to any of the Dorset Eskimos, but when the specimen was later shown to a group of Nuwata natives an old woman declared that she had seen a similar bird on the coastal plain south of Cape Weston a few years previously.

The Corn Crake breeds throughout Europe and Western Asia, extending its nesting range to the vicinity of the Arctic Circle, while it migrates as far as Cape Colony in South Africa. On this side of the Atlantic it has been recorded as an accidental visitor to Greenland, Newfoundland (?), and many points to the south on the Atlantic seaboard, and in Bermuda.

Charadrius hiaticula hiaticula (Linnæus). RINGED PLOVER.—This species is listed here, not because of important recent records, but because of the interesting discrepancy between Kumlien's observations in Cumberland Sound in 1877-1878 and those of the writer in Baffin Island from 1923 to 1931. Regarding this species Kumlien (1879, p. 83) says: "I am not aware that this species has hitherto been introduced into the North American fauna, though long known on the Greenland coast where Æ. *semipalmata* is rare. It is apparently more common than the preceding in Cumberland. Arrives about the same time, and breeds in similar localities".

During the past few years the writer has collected a large series of Plovers in Baffin Island principally at Pond Inlet, Cumberland Sound, Nettilling Lake, Bowman Bay, Cape Dorset, Amadjuak Bay, and Lake Harbour; with the exception of a pair of *hiaticula* collected at Pond Inlet on August 29, 1923, all of these Plovers prove to be *semipalmatus*. On the last expedition of 1930-31, to the Lake Harbour region, the effort was continued, in the collection of a series of specimens, to detect the presence of the Ringed Plover, but again all examples are referable to the Semipalmated Plover. In the light of these more recent results, the Kumlien observations at Cumberland Sound appear most remarkable.

Arenaria interpres morinella (Linnaeus). RUDDY TURNSTONE. — Eskimo: *Anuktau*. — The Ruddy Turnstone was formerly considered very rare in Baffin Island, as the only record of it here, up to 1928, is that of two individuals in the Hantzsch collection taken by Eskimos at Blacklead Island, Cumberland Sound, in late August, 1910. The species is not noted in Hantzsch's diary, so it is highly probable that he never observed this bird in Baffin Island.

It was first seen by the writer in Baffin Island at Nuwata (Foxe Channel) on August 20, 1928. During the next two days several of the birds were noted feeding on the mud flats at low tide in the same locality, and on the 23rd a pair was seen at Cape Weston. In 1929, a flock of 10 individuals appeared at Camp Kungovik on June 6. The species was commonly observed, thereafter, until June 20, when it became decidedly

scarcer, though a few pairs remained to nest in the locality. In early July Turnstones were comparatively common in the rough land of the Eswituk ridge, bordering the breeding grounds of the Blue Goose in latitude 65° 30′ N.

On July 3, a nest was found with four fresh eggs on a slight, rocky elevation of the tundra, after protracted searching on several occasions by the entire party. The nest was the most slovenly one that the writer had ever seen. It consisted of a barely perceptible depression in a patch of naked clay soil, in which the eggs lay directly in contact with the wet ground. All about were dry areas, such as would normally have been chosen by other species, but these were ignored, while no effort was made to line the nest with leaves, or grasses, which were plentiful in the vicinity. This is the first nesting record of the species in Baffin Island.

The Ruddy Turnstone is extremely shy during the breeding season and deserts its nest while one is still far off. Afterwards it gives no clue to its whereabouts, but keeps up a constant chatter and flies with aimless energy all over the locality. Consequently, discovery of the nest is difficult, and achieved by accident more than good management. The common call of the species is a loud and clear, *wheat-a-wheat-a-wheat-a*, given in a rapid, querulous tone.

While ascending the Bluegoose River in mid-July, the species was common on the limestone lowlands bordering the stream, as far as the latter was followed into the interior. In late July and early August it was tolerably common everywhere along the coast from Bowman Bay to Cape Ketoria and Garnet Bay. It was not observed in the Foxe Peninsula interior.

Pelidna alpina sakhalina (Vieillot). RED-BACKED SANDPIPER.—The Red-backed Sandpiper is a species which the writer had watched for in vain during previous years in Baffin Island. At last, however, it was detected at Camp Kungovik, where a single individual was collected in June 9, 1929. It appeared to be the only example in a flock of about 80 birds composed of White-rumped, Baird's, and Purple Sandpipers. Another specimen was obtained on June 17. Undoubtedly this is a very rare bird in the island, as the above were the only examples of the species collected, or observed, at Camp Kungovik during the spring and summer, and these constitute the first records for Baffin Island. The Eskimos had not previously seen this bird; consequently, no native name is available.

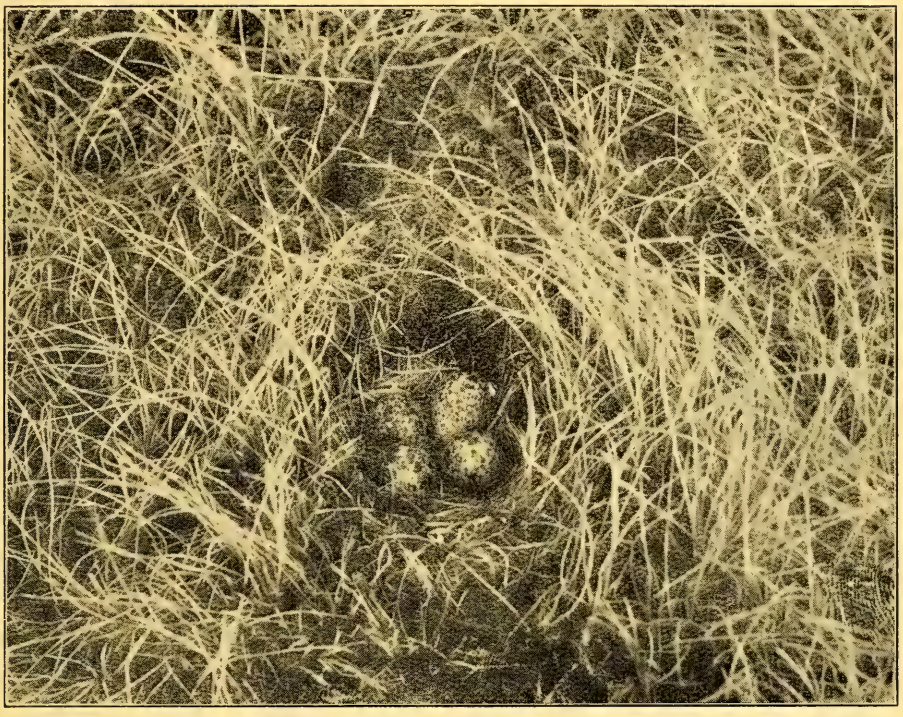
Phalaropus fulicarius (Linnaeus). RED PHALAROPE.—Eskimo: *Shokga*. —Previous to 1928 this species was observed but little in Baffin Island, the few specimens collected being secured during migration, spring and fall. Flocks observed were customarily at sea far from the coasts. Kumlien (1879) intimates that this species was breeding in Cumberland Sound; Hantzsch (1914) found them nesting sparingly at Tikerakjuak Point, Nettilling Lake, in July.

According to the writer's experience the Red Phalarope is never common along the south coast of Baffin Island, during either spring or fall migration, though small flocks are occasionally met with during the third week of June. There are no breeding records, nor does the species appear to occur in summer, or as transients during the autumn. This is a particularly curious circumstance in view of the fact that it is now known to breed abundantly in northern Foxe Peninsula and on the tundra along the coast of Bowman Bay and Foxe Basin, and that it appears as well in astonishing numbers, in late August, along the Foxe Channel coast at Nuwata.

The most interesting observations have to do with the species in the Bowman Bay region, where the writer spent the summer of 1929. Here, at Camp Kungovik, the first pairs and small flocks, put in an appearance on June 9. They steadily increased in numbers, by pairs and in flocks, of as many as 50 to 60 individuals, until June 19, when they then invaded the tundra by hundreds and thousands. This maximum abundance persisted for six days, that is, until the 24th, after which the birds gradually diminished in numbers, obviously to pass on to more northern breeding grounds. Large numbers, however, remained to nest in the region of Camp Kungovik and continued common on the tundra throughout the summer.

The first nest of the Red Phalarope was located on June 27. It held one egg. Within twenty-four hours of the discovery of this nest, more than a dozen others were found, some with a single egg, but the majority empty. On the morning of the 28th several others were discovered, some empty, and still under construction, others with one or two eggs, while one held the full complement of four.

The nest consists of a simple hollow in the moss and dead grasses of the open tundra, sparingly lined with the latter, and with a bottom pad of a few little dead leaves of the prevailing tundra willows, *Salix herbacea* and *S. reticulata*.



Nest and eggs of the Red Phalarope (Phalaropus fulicarius) on tundra plain near Bowman Bay. 29 June, 1929.

The finished receptacle for the eggs measures, on the average, 2¼ inches wide and 1½ inches deep, and is almost invariably overhung by drooping stems of old grass; this affords excellent concealment for the nest, as well as for the sitting bird. So closely does the dorsal plumage pattern of the species resemble this partially concealing screen that the incubating bird may easily defy detection at a distance of a few feet. The nests are easily found, however, owing to the bird's habit of flushing obtrusively from the nest only when almost trodden upon. With the assistance of his Eskimos, the writer had signal success in locating nests by arranging that the party should walk methodically over the tundra with an interval of a few yards between each two individuals. Sometimes the nest of the Red Phalarope is situated either on the crown, or on the side of a small grassy hummock, which may be entirely surrounded by water. So many empty, but newly constructed nests were found early in the season, many of which were subsequently ascertained never to have received eggs, that the writer came to the conclusion that this species has the habit of building many mimic nests before the actual egg-laying begins. Curiously enough, the male of this species is entirely responsible for the incubation of the eggs and rearing of the young. In temperament he is phlegmatic and rather easy going.

This is a great breeding ground of the species, probably one of the most important in existence; doubtless it extends over most of the western tundra from Bowman Bay to the limit of the plain north of the Koukdjuak River and eastward to Nettilling Lake At Bowman Bay they nested so commonly over the lowlands for miles about Camp Kungovik and south to, and over, the breeding grounds of the Blue Goose, that many nests were usually found on every tramp that was taken over the tundra. In the latter locality they were very plentiful and constituted the commonest breeding bird therein, exclusive of the Lapland Longspur.

During the first week of July sets of eggs of the Phalarope were complete, and all those collected were nearly, if not quite, fresh. At this period numbers of nests with three and four eggs were found which had been inundated by the

overflow of the Bluegoose River and were, of course, abandoned. Between July 9 and 11, several sets were taken which had been considerably incubated, and one contained well-developed embryos.

In a nest near camp, which was under daily observation, the young hatched on the afternoon of July 16. They were exceedingly dainty and beautiful little creatures with a uniform covering of silky, golden-coloured down, speckled over with brownish spots. The youngsters remained in the nest for several hours after hatching and then walked away under the leadership of the male parent. At this time the females had almost totally disappeared from the neighbourhood after having gathered in sociable flocks as early as the 10th of July.

The above family was again found on July 19. The male exhibited very marked anxiety as the young were approached, when they were found crouched in the grass after a lengthy and minute search. While held in the hand they continually uttered a low *"peep"*, which the parent responded to with the characteristic grating and half-whistled *"sreest"*. So anxious was the male for the chicks that he made bold enough to search for them in the grass within a foot of the writer, and then baffled, finally settled down in a brooding position and kept calling for the young to join him. Upon releasing them on a level with the ground they toddled away through the grass on their amazingly long legs, so tiny and weak still that they experienced marked difficulty in pushing their way through the tangle of stunted vegetation. Yet in three days' time they had succeeded in covering a distance of 120 paces from the nest where they were born. At this time their down was somewhat more developed, of a rich, dusky gold, with dark brown, to almost jet black, streaks and spots. Most interesting was the fact that their disproportionately large feet showed no evidence, as yet, of the curious lobes characteristic of the adults.

While descending the Bluegoose River between July 20 and 24, large flocks of these birds were noted on the tundra from latitude 65° 30′ N. along the loop of the river to its mouth at Bowman Bay. At Cape Alberta, from July 26 until August 5, Phalaropes were very common, but were observed in greater abundance during the last week of July. All observed were males, though females may have been present in flocks that were seen beyond the range of positive identification. In all probability the great majority of the females had departed to other regions to be joined later by males and immatures. This circumstance would seem to explain the presence of large flocks of Red Phalaropes in the North Atlantic off Hudson Strait and northern Labrador in the latter part of July, which are probably fully adult females and immature non-breeding birds of both sexes that congregate there immediately after the nesting season.

Based on the number of adult birds observed and the ideal character of the country at Cape Alberta, this section appears to be a fine breeding resort of the species. Young were observed on several occasions, and on August 4 one was encountered which was just capable of well-sustained flight. While voyaging along the coast westward to the Kommanik River, many individuals were observed daily, but they were distinctly fewer in number than to the eastward. During the ascent of the Kommanik River on August 12, 13 and 14, Red Phalaropes were observed in comparative abundance on the grassy river plains of the Foxe Basin slope, together with numerous immatures well a-wing. None, however, were noted to the south of Ungmaluktuk Lake on the southern watershed to Hudson Strait.

(To be concluded)

GRASSHOPPERS ROUTED BY GULLS

By F. BRADSHAW

ONE of the most spectacular demonstrations of systematic grasshopper destruction by birds that it has been my privilege to observe, was witnessed on Sunday, June 18, 1933, on the west side of Last Mountain Lake, east of Liberty, Saskatchewan. After spending the week photographing bird life in the Quill Lakes district, in company with Dan McCowan, well-known naturalist, of Banff Alberta, and Chas. F. Holmes, of Dollard, Saskatchewan, we were driving south when "Dan" called our attention to what at first looked like a cloud of smoke curling lazily above the horizon about two miles away. Upon closer approach the object of our attention began to take on an entirely new aspect.

It was first black, then silvery, and the recurrence of these shadings soon convinced us we were nearing one of the largest flocks of birds any of us had ever seen. We paid scant attention to some 500 Mallards feeding on burnt stubble, which sight, ordinarily, at this season of the year, would have aroused our curiosity, but pressed forward to solve the mystery of the myriads of winged nomads ahead.

Another mile and we overtook the object of our quest. We were surrounded by hundreds of thousands of Franklin's Gull. These beautiful land gulls, with their black heads, pearly-grey backs, white breasts, delicately tinted with a rosy hue, black and white wing tips, and reddish bills and legs, are named in honour of the arctic explorer, Sir John Franklin.

By this time they had alighted in column formation, a mile in extent, averaging sixty birds in width, covering almost every foot of ground within this area. They were attacking the devasting "hoppers" with army-like precision. Those in the rear after vanquishing the enemies in their immediate sector, would fly over the rest of the invading army and take up the front line attack. Strange to relate, when in this manner they arrived at the east and west cross-road of the field they did not pass over the highway, but wheeled round and commenced work again on another stretch of territory at the south end of the field.

Similar activities were in progress all round us. Occasionally the birds would take to the air in clouds so bewildering and of such magnitude that one's normal sense of calculating numbers of birds seen in flocks was completely out of gear and could not be satisfactorily adjusted to compute such an extraordinary spectacle. If one can visualize a well-filled sticky fly paper as a plan of the column referred to, using a scale of fifty yards to each fly paper one may have a faint idea of a portion of this vast flock, but mere words cannot portray the beautiful scene, nor adequately convey any idea of its greatness. Two miles to the south-west could be seen another cloud of gulls, which, if anything, seemed even larger than the one under review.

Franklin's Gull is the bird commonly seen following the plow, picking up insects from the newly turned furrows. It is almost entirely insectivorous in its habits. Fifteen kinds of insects have been found in the stomach of one specimen, including the nymphs of 327 dragon-flies; in another 82 beetles, 87 bugs and 984 ants. When grasshoppers are numerous, they constitute about 80% of the total food of Franklin's Gull. Assuming these figures as a basis, pending more accurate information, which we hope to secure this season, one may safely say that each gull will consume 500 grasshoppers daily. A very conservative estimate of the gulls observed feeding on the crop in question would be 1,000,000 birds and one may readily see that such an army of unhired help would quickly annihilate the grasshoppers in this area.

When the Mormons first settled in Utah, their crops were on the point of being ruined by grasshoppers, but large flocks of gulls invaded the territory and saved the crops from destruction. As the Mormons prospered they remembered the good work of the gulls and erected a magnificent monument in commemoration of their feathered friends. After seeing Franklin's Gull at work one can the more readily understand the significance of the Mormon incident, for any farmer who is so fortunate as to have these vast flocks of gulls visit his farm will have no cause to go to the trouble and expense of providing poison to combat this menace. Birds are one of nature's ways of combating insect pests. Some authorities go so far as to say that "successful agriculture without their aid would be impossible. Let us remember that: "Insects eat crops; Birds eat insects," and therefore the slogan of all public-spirited citizens should be "Save the birds".

NOTES AND OBSERVATIONS

TWO NEW CANADIAN LYMNAEAS.—A recent study of Canadian Mollusca has shown that several species are masquerading under wrong names. These will be more fully discussed in a paper in preparation but it is deemed important to correct such mistakes as soon as possible.

Stagnicola yukonensis Nov. Sp. This is the species described as *Galba vahlii* ('Beck' Mœller) in *The Lymnaeidae of North and Middle America*, p. 370, and figured on pl. 39, figs. 11-18. *Vahlii* is confined to Greenland and is

quite different from the species under discussion. The types are from a pond at Atlin, B.C., collected by Mr. J. Henderson. Types in coll. F. C. Baker, No. 1569. The species is common throughout Alaska, Yukon Territory, and Canada.

Stagnicola johnsoni Nov. Sp. This species was erroneously referred to *Lymnaea traskii* Tryon in the *Lymnaeidae* Monograph, p. 368, pl. 39, figs. 9, 10. The description in this work refers mainly to *johnsoni*, the true *traskii* being another form and confined to California. The type locality is Banff, Alberta, collected by Dr. C. W. Johnson, now deceased, to whose memory the species is dedicated. This is a common species in the mountain regions of Alberta and British Columbia and probably occurs in other parts of Canada. Types in Coll. F. C. Baker, No. 771.—FRANK C. BAKER.

BOOK REVIEW

BIOLOGICAL ETHICS, *an attempt to arouse a naturalistic conscience. By Prof. Dr. Oscar De Beaux, Curator of the Civic Museum of Natural History, Genoa. Edited by the Fascist Association Sportsmen, Prov. of Trento, and the Commission for Liguria of the Committee for the protection of Birds and for the disiribution of artificial nests. Milano. Translated from the Italian by Florence Perkes. From 'The Italian Mail and Tribune', Florence. 19-26 March, 2 April 1932. Pages 3-11.*

THE CONSERVATION ETHIC. *By Aldo Leopold, University of Wisconsin. Reprinted from Journal of Forestry, Vol. XXXI, No. 6, October, 1933. Pages 634-643.*

These two reprints are recent outstanding attempts, of diverse origin, to outline the application of a deep-delving philosophy to the problems of inter-specific relationships. They are so excellent that it is greatly to be desired that every one should read and comprehend them. The matter with which they are concerned is of fundamental importance to humanity as a species.

After pointing out the indisputable fact that we find ourselves existing in the field of biology, which is knowledge of life, Dr. De Beaux states that, in addition to the scientific and economic aspects of biology, there is also the moral aspect, which should form the basis of our thought, almost the fundamental, informative idea of all our action. He adopts as his definition of "moral" the "voluntary limitation of every individual or collective Will, by means of a constant control of our own feelings, and of a constant moderation of our own actions", and proceeds to show that there is really no antagonism between morals and utilitarianism, that they even stand in reciprocal relation, and that that which is moral is that which is really useful to humanity.

In the last analysis, the maximum biological benefit for humanity consists of its preservation, pure and simple, upon earth. As research has shown clearly that the question of existence is a question of surroundings, Man's surroundings must be a matter of the utmost concern to him. Civilized Man has freed himself from many of the bonds that restrict Primitive Man and occupies an eminently active position as to his life surroundings, which, indeed, are, at least potentially, the whole world, with all its vegetable, animal, and human life. Therefore "every substance, every kind of living thing that Man cannot create, has some importance or other for the human race, may represent a reserve still to be utilized at the opportune moment, the last reserve at the last moment".

Having thus presented his main argument, Dr. De Beaux proceeds to an expansion and application of his subject. Since the foundation on which his views are built is a moral one, it is useless to attempt discussion of the question with any who may be amoral by deliberate choice, but whoever feels himself moral in biological fact, may consider Biological Ethics as "The religion of respect to life in all its earthly extrinsic manifestations".

Two precepts of first importance are stressed. One is a commandment derivable from considerations already put forward: "Take care that no animal or vegetable species disappear from the face of the earth". The second is presented as the fundamental biological law of Nature: "No species may emerge and dominate to the prejudice of others". It is also pointed out that, while Man can and does continually and profoundly alter the natural equilibrium of his surroundings, he cannot modify the laws that govern it, and that his wise course, the only ultimately successful one, is to ally himself with all those species of the animal and vegetable

kingdom not living immediately and exclusively at the expense of his culture and so to favour certain intensities of the rhythm of the life of wild things about him, in order to maintain with them a natural biological equilibrium.

"Biological Equilibrium is not for mankind the absolute exclusive Good, which does not exist and cannot exist upon earth, but it is a fairly stable state of things that can be known pretty thoroughly, with which one can make previsions and calculations more dependable perhaps than with phenomena purely meteorological, physical or chemical. Re-establishing the equilibrium, when once it is suddenly and profundly disturbed, is a work that requires intelligence, patience and often sacrifice."

It is held that it is already demonstrated, in areas of high population density in Europe, as, for example, in Germany, that it is entirely practicable for wild creatures to live on the same territory with the maximum human population, and even to exist there in great variety and in reasonable abundance. Therefore it will be possible to preserve a varied and abundant population of other species even when the human population of the entire earth attains it maximum.

Finally, the practical position of Man in the face of the whole of Wild Life is held to be that Man is the Cerebral Being *par excel'ence* and that his position with regard to any other living being is therefore that of the Strong in face of the Weak.

"He must therefore be indulgent to the psychic inferiority of the Weak, to its slowness or absolute impossibility of comprehension or of adapting itself to new surroundings.

"He must, as a rule, renounce taking advantage of the state of psychic servitude to which the Weak, subject to the stimulus of hunger, thirst, or love, is absolutely incapable of resisting.

"He must renounce persecution of the Weak by technical means, with which muscles, lungs, and heart of living organisms cannot possibly compete, before which the last ways of escape are cut off, the last refuges violated:

"Where defence of Man is necessary, the Strong must eliminate entirely from his own mind any idea of guilt of the Weak; he must try to keep watch over him, possibly to offer him some cheap compensation, rather than proceed with unlimited force to suppression."

Application of these deductions does not mean abolition of biological research, or of utilization of other species for commerce and for hunting, but it does mean limitation of such activities and their co-ordination to the complex ethical and economic interests of all. Man thus becomes the wise administrator of Life on earth.

Prof. Leopold's paper deals with a particular part of the field covered by Dr. De Beaux's, and is more concerned with the application of biological ethics to conservation than with its derivation. Moreover, this paper, while having much to say about other species of plants and animals as essential parts of Man's surroundings, lays especial emphasis on the importance of the soil itself in molding his environment.

By way of introduction, attention is drawn to the fact that the extensions of the application of ethics to ever wider and wider fields, where it replaces expediency as the controlling principle, as mankind realizes the inadequacy of the latter to produce the best results, is actually a process in ecological evolution — it is biological as well as philosophical.

The first ethics dealt with the relationship between individuals.

Later accretions dealt with the relationship between the individual and society.

The time has come for a third step, the extension of ethics to man's relationship to land and to the non-human animals and plants which grow upon it.

A harmonious relation to land is of more consequence to civilization than the historians of its progress seem to realize. Civilization is not as they often assume, the enslavement of a stable and constant earth. It is a state of *mutual and interdependent co-operation* between human animals, other animals, plants, and soils, which may be disrupted at any moment by the failure of any of them. Land-despoliation has evicted nations, and can on occasion do it again.

"The swampy forests of Cæsar's Gaul were utterly changed by human use—for the better. Moses' land of milk and honey was utterly changed—for the worse. Both changes are the unpremeditated resultant of the impact between ecological and economic forces. We now decipher these reactions retrospectively. What could possibly be more important than to foresee and control them?"

We pride ourselves on our mastery of the tricks of physics and chemistry, and our engineering has attained the pearly gates of a near-millenium, but our applied biology still lives in nomad's tents of the stone age. If our system of land-use happens to be self-

perpetuating, we stay where we are. If it chances to be self-destructive, we move, like Abraham, to pastures new.

"In short, the reaction of land to occupancy determines the nature and duration of civilization. In arid climates the land may be destroyed. In all climates the plant succession determines what economic activities can be supported."

In this situation we have at our disposal three possible controls: legislation, self-interest, and ethics. Legislation and self-interest have been tried in various fields for some time past and have proved disappointingly unsuccessful. Our valuable soils are being wastefully eroded, our forests are being destroyed rather than cropped, and our migratory game birds are diminishing in numbers.

At this time, when our economic system is being made the subject of experiment, do the new economic formulae offer a short-cut to harmony with our environment?

"As nearly as I can see", says our author, "all the new isms - Socialism, Communism, Fascism and especially the late but not lamented Technocracy—outdo even Capitalism itself in their preoccupation with one thing: The distribution of more machine-made commodities to more people. They all preceed on the theory that if we can all keep warm and full, and all own a Ford and a radio, the good life will follow. Their programs differ only in ways to mobilize machines to this end. Though they despise each other, they are all, in respect of this objective, as identically alike as peas in a pod. They are competitive apostles of a single creed: *salvation by machinery.*" They lack any vital proposal for adjusting men and machines to land.

In wild life conservation, our concepts are just reaching the stage where *control of the environment* is recognized as the fundamental requirement.

Granted a community in which the combined beauty and utility of land determines the social status of its owner, and we will see a speedy dissolution of the economic obstacles which now beset conservation. Society may then paint a new and better picture of itself. Economic laws may be permanent, but their impact reflects what people want, which in turn reflects what they know and what they are.

"The ultimate issue, in conservation as in other social problems, is whether the mass-mind *wants to* extend its powers of comprehending the world in which it lives, or, granted the desire, *has the capacity to do so.*"

Although both of these papers are concerned with the application of ethical standards to the relations between Man and his environment, and although Dr. De Beaux makes use of explicit moral premises for his argument, their presentation of the results to be sought is limited mainly to the utilitarian and the anthropocentric. That these form only a part of the goal that should determine our attitude toward the other species on earth with us and that it is logical to seek a composite perfection of all life as a system inclusive of all specific perfections, the reviewer has already pointed out elsewhere.[1] In these papers it is merely hinted at.

The public discussion of these questions by those interested in wild life conservation in various nations of the globe is a most encouraging indication. That it will continue and develop until fundamental ethical considerations actually direct our policies with regard to our relations to our fellow-species is greatly to be hoped.—H.F.L.

---

[1] A general discussion of the subject, in both its utilitarian and its ideal aspects, was published by Dr. Lewis under the title, "The Philosophy of Wild Life Conservation", in *Rod and Gun and Canadian Silver Fox News*, 29:206-207, August, 1927. —Ed., C.F.-N.

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VOL. XLVIII OTTAWA, CANADA, MAY, 1934 No. 5

THE CANADIAN SNOWSHOE RABBIT ENQUIRY, 1932-33

Edited by CHARLES ELTON

Edited for the National Parks Branch, Department of the Interior, Ottawa, by CHARLES ELTON, Director of the Bureau of Animal Population, Department of Zoology and Comparative Anatomy, Oxford University, England.)

IN 1931 the Commissioner of National Parks, Mr. J. B. Harkin, authorized an enquiry into the ten-year cyclical fluctuations of the Snowshoe Rabbit or Varying Hare (*Lepus americanus*) which are of such great economic and biological importance in Canada—economically, through their influence on the fur-trade, conservation, food supply, and forest damage, and biologically through the scientific interest of their fluctuations and the fact that these form a useful index of similar periodic changes in the populations of other forest animals and of game-birds, which in turn have economic implications. A questionnaire enquiry was carried out from Ottawa under the general supervision of Mr. Hoyes Lloyd, and the results mapped at Oxford and published in *The Canadian Field-Naturalist* 47: 63-69, 84-86, 1933. The successful coordination of these results justified the continuance of the enquiry as an annual one, and the present report covers the twelve months ending May 31st, 1933, this forming a useful biological year which also corresponds with the working year ("Outfit") of the Hudson's Bay Company. The questionnaire was similar to the one used in the first enquiry, the main feature being the comparison of abundance with that of the previous year and not simply with some vague concept of the "usual". In this way a running record (up, level, or down) is obtained from year to year. Other questions dealt with habitats, disease, and former years of abundance and scarcity. Five hundred replies were received, an increase of nearly 50%. Owing to the fact that observers were in a better position to know what to look out for, the standard of replies was even higher than before and rendered accurate mapping possible in most instances. I wish to express my appreciation of the services rendered by the following:—

Mr. W. D. Taylor, National Parks of Canada, who handled the details of the National Parks questionnaire, the Royal Canadian Mounted Police, the Game Officers of the Provinces of Canada, Honorary Game Officers under the Migratory Birds Convention Act, Holders of Scientific Permits under the Migratory Birds Convention Act, Taxidermists, Superintendents and Wardens of the National Parks of Canada and other observers throughout Canada. My wife, Rose Elton, has given very valuable assistance during the work on this material.

This year it was fortunately possible to include also the information contained in the annual zoological reports (176 in number) from the Hudson's Bay Company's fur posts, which have been renewed after a short interval, owing to the interest taken in the enquiry by the Governor, Mr. Ashley Cooper, and the Fur-Trade Commissioner, Mr. Ralph Parsons. The Governor and Committee of the Company have kindly agreed to the publication of this information, which I have combined with that from the National Parks Branch enquiry in the three maps shown in Figs. 1-3. Dr. A. G. Huntsman has also obtained through the fishery organisation valuable information from the Maritime Provinces, but this is not available in time for inclusion in the present survey. Information about snowshoe rabbits is also promised from Alaska and Newfoundland, the former by courtesy of the U.S. Bureau of Biological Survey and the Alaska Game Commission, and the latter by the co-operation of the Commissioner of Natural Resources in Newfoundland. It is hoped, therefore, in future years to make these maps international in scope, so as to give an annual record of the snowshoe rabbit cycle from Behring Strait to the Atlantic. In carrying out preliminary negotiations I have to thank Mr. Copley Amory and Sir Wilfred Grenfell, both of whom gave me valuable advice and practical assistance.

It has been mentioned that one special technical feature of this enquiry is the year-to-year comparison of abundance. The second feature is the method by which the results are

mapped. The details of procedure were explained fully in the previous report and need not be repeated here: the essence of the method is that the *area* covered by each observer is plotted as accurately as possible on a large-scale map and noted as "more", "no change", or "less". Areas with "none" (meaning "permanently none") are ignored for the present purpose. When the area is not accurately specified, a circle of ten-miles radius (twenty miles across) is drawn round the central point. The data from the large-scale maps are then transferred to a smaller-scale map of Canada by means of a grid of 30-mile squares (900 square miles in each). Since a square is marked in even when only a part of it is covered by an observer, the final results occupy a greater area than the original observations. But as the main object of the method is to make standard comparisons from year to year without introducing the subjective opinions of the mapper who is studying the replies to questions, this exaggeration of the original areas covered is not a serious matter. The area mapping method has the advantage of giving due weight to the widely different sizes of area covered by different observers.

The gross area of the squares on the grid overlapped by observers was, for the National Parks enquiry, about 640,000 square miles, and for the Hudson's Bay Company posts about a million square miles. There is, of course, a good deal of overlapping between the two systems, although the former tends to occupy the more settled regions of Canada and the latter the northern and more remote forests. The total area covered by filled-in squares on the final joint map is 1,500,300 square miles, so that the overlap is seen to be about 140,000 square miles, or 9% of the whole. It is thus apparent that the National Parks enquiry and the Hudson's Bay Company reports dovetail in a most

Figure I. State of the snowshoe rabbit population in 1932-33. Dotted areas are groups of squares overlapped by areas of observers reporting relative increase in 1932-33 over 1931-32. Larger black dots are Hudson's Bay Company posts etc. Broken lines show main vegetation zones.

valuable manner and between them cover most of the inhabited regions of Canada south of the tree limit and north of the prairie. A number of reports do, in fact, cover a further portion of the settled belts in which rabbits are scarce or absent: these have been omitted from the present analysis. In mapping the Hudson's Bay Company results a conventional area of fifty miles radius (a circle a hundred miles across) was allotted to each post, following the advice of the company's officials. In most instances this is admitted to be an underestimate. The information is supplied by the post manager, on the basis of his own observations and those of trappers and other visitors to the post. Where overlapping occurs between neighbouring posts, any difference in record is mapped by dividing the territories in a simple geometrical manner. In future years it will be possible to obtain more precise information about the exact regions to which observations for each post refer.

It was considered advisable to try to estimate the degree to which the grid system does exaggerate the actual area of ground covered by observers, who do not, of course, form a completely overlapping system of "territories." This was done by measuring the actual original areas plotted on the large scale maps of the provinces, by means of an Amsler planimeter. The technique is a good deal more laborious than the grid method but the results have a high degree of accuracy—much higher than the actual plotting of areas from observers' descriptions. Only the National Parks were examined in this way. In carrying out this special test I wish to acknowledge the assistance kindly given by Mrs. M. J. Baden-Powell who also copied a number of large scale tracings for the Bureau. Prince Edward Island was omitted owing to insufficient data. The total area covered by the National Parks results was for the grid about 512,000 square miles, and for planimeter measurements about 275,000 square miles, the latter

Figure 2. State of the snowshoe rabbit population in 1932-33. Vertically hatched areas are groups of squares overlapped by areas of observers reporting relative decrease in 1932-33 over 1931-32. Horizontally hatched areas, no change. Larger black dots are Hudson's Bay Company posts etc. Broken lines show main vegetation zones.

being 54% of the former. Thus the grid method about doubles the apparent area covered by the network of observers. The second point that can be tested by the planimeter work is whether the relative amounts of "more", "no change", "less" and "overlaps" are the same by the two methods. Analysis shows that the grid is quite a reliable guide to the ratios between these different categories. It is hoped to publish the details of this analysis at some other time, together with another analysis which would enable the reliability of observers to be tested statistically (by the frequency of agreement among observers covering the same territories).

We now have to analyze the results of the main map (Figs. 1-3). Of the 1667 squares covered, 1508 (=90%) recorded more, 159 (=9%) no change, and 189 (=10%) less. The amount of overlap by the squares recording more, on others, was 8%. Thus the percentage of the whole area recording more snowshoe rabbits in 1932-33 than in 1931-32 was between 82 and 90. The higher figure would be correct if all the recorded overlaps were apparent (*e. g.* "more" in one corner of a square and "less" in another, with no real overlap). The true figure lies somewhere between the two. It is clear that rabbits were still on the increase in most parts of Canada in 1932. It will be remembered that the percentage recording increase in 1931-32 over 1930-31 was 85-92: almost the same.

The increase areas have been shown on one map (Fig. 1) and the decrease and no change figures on another(Fig. 2). The third map(Fig. 3) shows that a most important change had taken place in the snowshoe rabbit population during 1932, for the previous year had shown increase with little evidence of widespread disease, while the reports for 1932 show the onset of important epidemics over a large part of the West and in some other parts of Canada, in almost all cases in areas which showed continuous increase during the summer of 1932. Most of the epidemics took place during the winter of 1932-33 and spring of 1933. There is not space to enter into a detailed

Figure 3. Epidemics among snowshoe rabbits. Dotted areas are groups of squares overlapped by observers reporting epidemics and decrease in 1932-33. Most of these epidemics took place in winter and spring 1932-33 after continued increase in previous summer. (See Fig. I.)

description of the numerous reports dealing with these epidemics. It may be remarked that spotted liver disease (coccidiosis or tularæmia) occurred in several instances, that the usual increase in tapeworms [Cestodes] and in ticks [Ixodidæ] was recorded commonly, and that in some places the epidemics were very severe while in others they did not seem to have seriously affected the numbers. The examination of these epidemic reports will have to be done by a pathologist with experience of snowshoe rabbit disease, since the symptoms described are rather varied. From recent work that has been done in Canada, it appears probable that tularæmia may be much more widespread in the northern forests than has been generally supposed, and that the snowshoe rabbit fluctuations may assume an important medical aspect. Any observer finding snowshoe rabbits infested with ticks, whether the animal be alive, dying, or recently dead, can be of service by keeping some of the ticks alive and posting them with suitable covering information to any of the pathologists who are at present studying this problem: Dr. Eric Hearle, Entomological Laboratory, Kamloops, British Columbia; Dr. R. G. Green, Medical School, Minnesota University; Dr. R. R. Parker, Spotted Fever Laboratory, Hamilton, Montana; or the Alberta investigation under the direction of Professor William Rowan, Department of Zoology, Alberta University, Edmonton,—to mention some of those of whom the writer has personal knowledge. The tularæmia bacillus can be recovered from infected ticks, and the presence of the disease thus proved.

The maps can be further analyzed according to the different provinces, and the results for the whole grid are given in table No. 1.

Where two percentages are given, the higher is that obtained without allowing for overlaps with other categories (less, no change), the lower after subtracting the percentage overlap. The variation in overlapping is great in different regions. It is most marked in the Maritime Provinces and the settled parts of Ontario and Quebec. (Prince Edward Island has been omitted from the table owing to incomplete data).

The regional distribution of the epidemic is of interest. The results are shown in table No. 2, as percentage number of squares relative to the whole and to those reporting increase (no allowance has been made for overlaps). The main incidence was in the Middle West, and here the epidemics were almost entirely confined to the northern forests. The high figures for New Brunswick and Nova Scotia may or may not be of significance in the ten-year cycle: we have yet to prove for certain that the Maritime Provinces take part in the regular fluctuation. It has also to be remembered that the rabbit population is in these provinces much more split up into small colonies, and this is probably the cause of the very great overlap in opinions which makes the high epidemic fig-

TABLE No. 1

	Total squares covered	No. squares reporting increase	% squares reporting increase	No. squares reporting decrease	% squares reporting decrease	No. squares reporting no change	% squares reporting no change
Yukon	30	28	**93**	2	**7**	0	**0**
Northwest Territories	187	154	**76-82**	28	**10-15**	16	**8-9**
British Columbia	180	174	**89-97**	2	**0-1**	21	**3-12**
Alberta	307	301	**82-84**	0	**0**	15	**2-5**
Saskatchewan	140	114	**66-81**	27	**9-19**	27	**9-19**
Manitoba	157	149	**95**	0	**0**	8	**5**
Ontario	326	276	**75-85**	58	**10-18**	46	**4-14**
Quebec	295	281	**94-95**	14	**1-5**	32	**1-11**
New Brunswick	20	17	**50-85**	8	**10-40**	4	**0-20**
Nova Scotia	25	14	**12-56**	20	**16-80**	20	**16-80**
TOTAL	1667	1508	**82-90**	159	**4-10**	189	**4-11**

TABLE No. 2

	No of squares reporting epidemics 1932-33	% of squares reporting epidemics (out of total covered squares)	% of squares reporting epidemics (out of increase squares)
Yukon	2	7	7
Northwest Territories	19	10	12
British Columbia	31	17	18
Alberta	118	38	39
Saskatchewan	31	22	27
Manitoba	9	6	6
Ontario	13	4	5
Quebec	33	11	12
New Brunswick	6	30	35
Nova Scotia	9	36	64
TOTAL	271	16	18

ures of less importance than those for the West where the opinions are much more unanimous. The 1932 epidemics are the first widespread sign of the periodic decline of snowshoe rabbits in Canada, and we may expect to find decrease setting in in other areas until the map is covered with practically 90% *decrease* in a few years' time. The main epidemic in Alberta and Peace River is independently confirmed by the National Parks and Hudson's Bay Company enquiries which here overlap to a considerable extent. In Alberta the epidemic area runs across to the east side of Lesser Slave Lake and mainly north of the 55th parallel, and in Saskatchewan it runs across to a definite point at which there is a belt of high density with no further increase but no epidemic, and east of this again high density and increase with no epidemic. In the next few years it may be possible to construct a fairly good contour map showing the development of these epidemics. There is a report of local disease in the Mackenzie River Delta and also somewhere in the region of Fort Providence west of Great Slave Lake. These have not been mapped owing to lack of exact localities. Apart from these two reports and those from Liard River, there was no definite evidence of decrease through disease in 1932 in the northern part of the Northwest Territories. The main regional incidence of the epidemics is in line with that noticed in previous cycles, where decrease usually began in the West and spread eastwards, and started first in the northern forests, only coming to the grove belt and southern forests of the eastern part of Canada a year or two later.

On the practical side, it may be safely forecast that the decline in fine fur began in 1932-33 and will continue to an increasing extent during the next four years (*e.g.* Lynx [*Lynx canadensis*] Coloured Fox, [*Vulpes* sp.] and also Wolf, [*Canis lycaon*] Coyote, [*Canis latrans*], etc.) The parallel cycle in game birds now well substantiated, will also begin to show a decline, so that sportsman may expect fewer Ruffed Grouse, [*Bonasa umbellus*], etc.

Much further work remains to be done in analysing the abundant material obtained from the enquiry, but it seemed desirable to present the preliminary results as soon as possible. Copies of the questionnaires, the large scale tracings, and the final maps, are being deposited at the National Parks Branch in Ottawa, and in the Bureau of Animal Population at Oxford.

INTERESTING BIRD RECORDS FOR SOUTHERN BAFFIN ISLAND

By J. DEWEY SOPER

(*Concluded from page 68*)

Larus kumlieni Brewster. KUMLIEN'S GULL.—Eskimo: *Nowyva; Newcupelu Nowya.*—A special interest attaches to this bird in view of recent observations in Baffin Island and the fact that it is now regarded by the American Ornithologists' Union as no longer of specific rank, but a hybrid between *leucopterus* and *thayeri*. As the latest information seems to discredit this conclusion and as very little was previously known of the distribution and habits of this bird, it appears worthy of somewhat extended treatment based on the latest information from the breeding range.

So far as known this gull breeds only in southern Baffin Island; available records indicate that it has never been observed north of Cumberland Sound, which was the only known breeding place until investigations were recently made along the south coast of the island. It has now been ascertained to inhabit the Davis Strait coast to the south of that, and the entire north side of Hudson Strait westward to King Charles Cape. In 1926, and again in 1928-1929, the writer found the species common in the region of Cape Dorset with breeding colonies on the mainland north of the west end of Okolliltuk Island and on the Foxe Islands near Andrew Gordon Bay. Kumlien's Gulls were seen commonly to the westward as far as King Charles Cape, in mid-August 1928, but none were noted to the north as far as the coast was followed to Cape Dorchester.

During the autumn of 1928 and again in the spring and summer of 1929 it was not observed anywhere in the interior north of Andrew Gordon Bay or along the coasts of Bowman Bay, or Foxe Basin. The birds were frequently seen about Cape Dorset in early September, but after that became very scarce. The last record for the fall is a queried entry at Cape Dorset on October 11, for a small flock observed under unfavourable circumstances. The species is more local in distribution than the Glaucous and Herring Gulls and unquestionably migrates from the region in the autumn much earlier than either of the above species.

In the Lake Harbour region the species is locally common and nests in a number of localities from at least Soper Lake (Pleasant Inlet) eastwardly to Itivirk Bay. The birds appear to be strictly maritime; unlike several other gulls in Baffin Island, the writer has never seen it inland, or nesting in other than the immediate vicinity of the sea. In summer their movements appear to be so local that individuals are seldom encountered at any great distance from nesting places.

In the spring of 1931 it was learned that a breeding colony of Kumlien's Gull existed on a small island in Soper Lake, near the entrance to Pleasant Inlet. This was visited by the Eskimos on June 7, when a considerable number of fresh eggs were taken. On the 10th the writer, with an Eskimo assistant, visited the spot when it was found that the colony consisted of about 80 individuals of the present species and one or two breeding pairs of Glaucous Gulls. The birds were nesting on the grassy ledges of an almost sheer cliff about 75 feet high overlooking the sea. At this time the surrounding sea was still covered with ice, and deep snow-banks persisted on the adjoining mainland.

The nests were rather shallow structures resembling those of the Herring Gull and composed of old vegetable matter. Some, obviously several years old, had been repeatedly renewed and the old outer parts of the structures were now welded together and overgrown with living grasses and other lowly plants. The greater number of these were quite inaccessible without the aid of ropes. Owing to the recent activities of the Eskimos, the nests were now empty, or contained but one egg. This appears to be a very early record for gulls in Baffin Island, as fresh eggs of this species were collected by the writer near Cape Dorset on June 24, 1926. The Eskimos assert that gull nesting dates are earlier to the southeast and progressively later to the northwest along the south coast of Baffin Island.

The above colony was revisited on June 27, when a single set of Kumlien's Gull eggs was secured; these were considerably incubated. Despite the ravages of the natives here early in June, the gulls had not deserted, but nested again. Such nests as could be seen contained two or three eggs. In colour they are practically indistinguishable from these of the Glaucous Gull, but in size are much smaller, while they appear quite inseparable from those of the Herring Gull of corresponding size. Owing to the very limited number of Kumlien's Gull eggs available and the great variability in the eggs of gulls, no definite

statement can be made, but it appears probable that the eggs of *kumlieni* will average smaller than those of the Herring Gull. The Kumlien's Gull eggs collected are ovate and finely granular with little or no sheen; ground colour is deep, dark brown, and more obscure purplish spots. The markings on one egg are large and roundly bold, and merge to some extent with an area of deversified blotches about the larger end; on the other end the spots are small, irregular, and evenly distributed. Sizes: 2.46 x 1.86 inches (62.5 x 47.5 mm), and 2.55 x 1.88 inches (65.0 x 48.1).

In mid-July while following the coast southeast of Lake Harbour to Philpot Bay, large numbers of birds were met with at various times. On the east side of the northernmost extremity of Itivirk Bay a large nesting colony of about 300 individuals were observed. The nests were placed on shelving, grassy ledges of high cliff rising directly from the sea. At this time the nests held young still being tended by the adults. Contrary to conditions which not uncommonly obtain, no other gulls were seen associating with Kumlien's Gulls of this colony. The Eskimos stated that the present species nests in scattered groups farther to the eastward along the coast and north into Frobisher Bay.

Kumlien's Gull was described by Brewster (1883) from a specimen secured by Ludwig Kumlien in Cumberland Sound on June 14, 1878. When Kumlien found this gull breeding there he first referred it to *glaucesens*, but it was subsequently recognized as a new species. Kumlien also collected a single egg of this species, which appears to have been the only authentic one in existence up to the time of the collection of the above set at Lake Harbour. Bent (1921) remarks: "Several sets of eggs were collected by Mr. J. S. Warmbath on one of the Peary expeditions, which have since found their way into collections as eggs of Kumlien's Gull. These eggs were taken in Ellesmere Land on June 15, 1900, and are probably eggs of a new species of gull, to be known as *Larus thayeri*. Probably the only authentic egg of *Larus kumlieni* in existence is the one referred to above as taken by Kumlien. This egg is now in the United States Museum; it is a miserable specimen, too badly broken to measure accurately, and is tied together withh thread".

In the new fourth edition of the American Ornithologists' Union Check-List, Kumlien's Gull has been transferred from the regular List to the Hypothetical List with the following comment: "Now regarded as a hybrid between *Larus leucopterus* Faber and *Larus argentatus* Brooks (cf., Dwight, Bull. Amer. Mus. Nat. Hist., LII, Art. 3, Dec. 31, 1925, 254) and transferred to the Hypothetical List".

In the writer's opinion this change appears unwarranted in view of the assembled facts. An examination of the specimens alone may admittedly lead to the above conclusion of hybridism, but conditions in the field support the earlier concept of *kumlieni* as entitled to specific standing. In the first place the known breeding range of Kumlien's Gull does not coincide with that of either the Iceland Gull, or Thayer's Gull; the two latter species are rare in southern Baffin Island even during migration and no nesting records exist for either in that territory, while the only known nesting places for Kumlien's Gull are in southern Baffin Island. As earlier mentioned, this species is not known to occur north of Cumberland Sound and until the writer made wild life investigations along the south coast of Baffin Island (1926, 1930-1931) the former locality was the only breeding place known. As Kumlien found it nesting in Cumberland Sound, and the writer at various places from Itivirk Bay to Cape Dorset, it would now appear to have a more or less unbroken breeding range from Cumberland Sound to Foxe Peninsula.

In the writer's Baffin Island report of 1928 appears the following in respect to *leucopterus*:* "This species is so scarce about Baffin Island that the only evidence of its existence secured by the writer is an adult and a juvenile, collected on August 18, 1924, near Blacklead Island, Cumberland Sound. Kumlien (1879, p. 98) merely remarks that it is far less common in Cumberland Sound than the Glaucous Gull. This species was not noted by Hantzsch". In regard to *argentatus* and *thayeri* are these remarks: "Specimens collected by the writer indicate that *Larus thayeri* is confined to a northern area extending from Ponds Inlet to southern Ellesmere Island, and that *L. argentatus* occurs only in the southern part of Baffin Island. *Larus thayeri* was observed only while on the 1923 Canadian Arctic Expedition when specimens were collected at Craig Harbour, Ellesmere Island; Beechey Island; Dundas Harbour, Devon Island; and Pond Inlet, Baffin Island. The species seemed to be particularly numerous in Lancaster Sound. It seems probable that the breeding ranges of *L. argentatus* and *L. thayeri* overlap somewhere between Cumberland Sound and Pond Inlet". Though much work has been

* Mr. P. A. Taverner informs me that the National Museum of Canada has no substantiated records of *leucopterus* breeding in the American Arctic.

done in that country since the above was written, the remarks on the scarcity of the two above species still hold good. In fact, on the expeditions of 1928-1929, and 1930-1931, to southern Baffin Island, the writer failed to observe a single example of either *leucopterus* or *thayeri*.

Along the south coast of Baffin Island *kumlieni* has been found nesting in pure colonies at Cape Dorset and Itivirk Bay, and also in several other localities, more or less in association with Glaucous and Herring Gulls. In view of the above facts it appears incredible that Kumlien's Gull could exist as a hybrid between Thayer's and Iceland Gulls, two species with which it does not associate in any way during the nesting season. It is believed that the circumstances in nature go to disprove hybridism and again entitle Kumlien's Gull to full specific standing.

Xema sabini (Sabine). SABINE'S GULL.—Eskimo: *Nowyaluga*.—Up to 1928 this beautiful little gull was considered to be very rare in Baffin Island, as no observer had seen more than a few straggling individuals. In the region of Bowman Bay, however, the writer, in 1929, found them in large numbers and breeding freely on the tundra. At Camp Kungovik it first put in an appearance on June 14. The first spring migrants were solitary birds, but on June 16 the birds began to arrive in flocks varying from 10 to 25 individuals. Their numbers were steadily augmented until the 26th of the month when they became one of the commonest birds of the district. A series of specimens secured shortly after the species' arrival, in which males and females were about equally represented, indicated that the two sexes came together.

On July 2, a small colony of 20 pairs of Sabine's Gull was located at a tundra pond near the Blue-goose River. More than a dozen nests were found in a state of apparent completion, though the majority as yet contained no eggs; four that did held three, two, one, and one, respectively. The nests are built directly upon the low moist ground on the margin of pools, or on little hummocks and islets a few feet from shore. They are constructed of mosses common to pool-side areas of the lowlands and lined with a few dead grasses. The species is very demonstrative and excitable when their nests are approached, after the manner of Arctic Terns, which were associating with them.

Several additional solitary nests were found on July 3 and 4 on the margin of various small ponds, or on moss-grown hummocks therein, which were scattered about over the nesting range of the Blue Goose. All sets collected at this time were fresh. A return was made on July 10 to the colony discovered on the 2nd of the month, when nine additional sets were secured; all were considerably incubated, with the exception of four sets, which were fresh. The prevailing habit of building nests on small hummocks and islands in the ponds probably arises from the necessity for protection from prowling foxes. No nest of this dashing little gull was found ravaged in any way, which seems to indicate that the eggs of this species, unlike those of the Herring Gulls and the geese, escape the pernicious attentions of the Parasitic and Long-tailed Jaegers.

After leaving the Blue Goose plain on July 24, Sabine's Gull was commonly observed about Bowman Bay and on the pool-sprinkled, rocky lowlands about Cape Alberta during late July and early August. It was also met with daily along the Foxe Basin coast as far as the mouth of the Kommonick River, after which the species was not again observed.

Oenanthe oenanthe leucorhoa (Gmelin). GREENLAND WHEATER.—Eskimo: *Ekuliqak*.—The writer's experience in Baffin Island since 1923, indicates that this bird is one of the rarest of the island's avifauna. Previous to the expedition of 1930-1931 to the Lake Harbour region, authentic records of its occurrence in Baffin Island existed only for Cumberland Sound and westward at Nettilling Fjord and Amittok Lake, where it had been observed by Kumlien, Hantzsch and the writer. Kumlien (1879) stated that the species breeds on both shores of Cumberland Sound. This evidently is the only record extant of its nesting on the island.

Upon arriving at Lake Harbour in late July, 1930, the writer was told of a small bird which had nested in the crevice of a rock near the post about a month earlier. The nest was at arm's length in a natural fissure, composed of moss and grasses and contained four eggs. From the general description it appears certain that this bird was a Greenland Wheatear. During that season the species was nowhere observed by the writer.

In 1931, a single Wheatear was observed personally on June 12, and another on the 14th. On the 27th of the month a nesting pair was located on the property of the Anglican Mission. The nest was finally discovered in a stone wall supporting an earthen terrace about the house. The nest was difficult of access, as it had been built in a cavity among the stones fully 20 inches from the face of the wall. Permission was kindly given to collect the nest and eggs The former is a bulky structure, composed of moss and dead grasses—the latter predominating—with a lining

of fine grasses and small feathers. The eggs, six in number, are perfectly plain in colour, between etain-blue and pale Niagara green (Ridgway), or bluish white; the average size is .84 x .65 inches. Judging from the condition of the eggs, it appeared that egg-laying had begun sometime between the 20th and 22nd of the month.

After the female bird had been collected the male lingered about for a day or two and then disappeared. Early in July, Mr. Bailey, the missionary, informed me that a pair of Wheatears were again nesting in precisely the same crevice from which the earlier nest had been removed. This was verified personally on July 7, when the second nest was almost completed.

Junco hyemalis hyemalis (Linnaeus). SLATE-COLOURED JUNCO.—On June 2, 1931, the writer collected a specimen of this species half a mile north of the Lake Harbour settlement It was first detected as it flitted under some boulders of a talus slide below a precipitous granite hillside. At first glance it was thought to be a female Snow Bunting, but when it reappeared and flitted away with flashing outer white tail feathers it was instantly recognized as something new. This constitutes the first record of the species in Baffin Island. The bird seemed singularly out of place so far north of the tree line, with Hudson Strait intervening, and surrounded by such a bleak, rocky environment. None of the Eskimos to whom it was shown had ever seen it before.

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NOTES AND OBSERVATIONS

AMERICAN BARN OWL (*Tyto alba*) AT OTTAWA.—During the latter part of the month me, in detail, an Owl held captive at the fruit of October, 1933, my eldest son described to and vegetable farm of Mr. H. L. Bailey situated on the Bowesville Road, about one mile from the southern limits of Ottawa.

The Owl was sent to a local taxidermist to mount so I did not see the bird alive. However, on January 2, 1934, Mr. Bailey's son brought the mounted Owl to my residence and I was able to verify my son's identification of it as an American Barn Owl. I am informed that the bird was captured in a neighbouring barn not far from the farm of Mr. Bailey.—C. E. JOHNSON.

A NORTHERN RECORD FOR THE STARLING, *Sturnus vulgaris*.—During the spring of 1931, while I was at Churchill, Manitoba, collecting birds for the Carnegie Museum under the leadership of Mr. John B. Semple, Mr. Hugh Conn, Manager for the Nelson River District of the Hudson's Bay Company, gave me a Starling. Dr. George M. Sutton of Cornell University and I examined the specimen but were unable to determine its sex. Nor were we able to save it as a skin.

Mr. Conn told me that he had found the bird dead in an old, unused building at York Factory, on May 11th, 1931. When picked up it was still warm, as if it had just killed itself by flying into a window.

York Factory is situated at the mouth of the Hayes and Nelson Rivers along the west coast of Hudson Bay, and is about sixty-five miles from the nearest point along the Hudson Bay Railway.

The weather was mild at the time the bird was found. There was some snow on the ground and the rivers were frozen shut.—A. C. LLOYD.

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The official publications of THE OTTAWA FIELD-NATURALISTS' CLUB have been issued since 1879. The first were *The Transactions of the Ottawa Field-Naturalists' Club*, 1879-1886, two volumes; the next, *The Ottawa Naturalist*, 1886-1919, thirty-two volumes; and these have been continued by *The Canadian Field-Naturalist* to date. *The Canadian Field-Naturalist* is issued monthly, except for the months of June, July and August. Its scope is the publication of the results of original research in all departments of Natural History.

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W. O. Mallett

The Canadian Field-Naturalist

VOL. XLVIII OTTAWA, CANADA, SEPTEMBER, 1934 No. 6

MALTE OSCAR MALTE

OSCAR MALTE was born in Skillinge, Sweden, on March 8, 1880, his father being a merchant of that town. His early education was received from a private tutor. When he was twelve years old he entered the collegiate school of Ystad and in 1899 he became an undergraduate of the University of Lund, where he obtained the degree of B.A. four years later with especially high honours not only in his botanical subjects but also in zoology, chemistry and physics. In 1910 he received the degree of Licentiate of Philosophy, again carrying honours in systematic botany and plant physiology. In the same year he successfully defended a thesis for the degree of Ph.D. This paper was entitled *Embryological and Cytological Investigations in Mercurialis annua* and comprised 96 pages with 3 plates. From the time Dr. Malte received his B.A. degree until he left Sweden for Canada his time must have been very fully occupied. For six years he acted as "amanuensis" at the Botanic Garden of Lund, being responsible for the correct naming of the plants growing in the garden, which was no mean undertaking. During the same period he was Curator of the herbarium of the Botanical Exchange Club of Lund, and was one of a committee responsible for the correctness of the names of all plants exchanged. The number of species and varieties exchanged was large, as many as 3,000 passing through the hands of the committee in a year.

He obtained in 1903 a special grant for the study of the marine flora of the west coast of Sweden, and the following year he was again successful in obtaining a grant for studying the myxomycetes of Sweden. During the summer vacations of 1905-1907 inclusive, and again for part of the summer of 1910, he acted as Assistant at the Plant Breeding Station, Svalof.

In 1910 Dr. Malte decided to join the staff of the Dominion Department of Agriculture. Mr. L. H. Newman, who, as Secretary to the Canadian Seed Growers' Association, was in Sweden working at Svalof, wrote as follows: "From these people (the scientific men of Sweden) I was able to learn that Dr. Malte occupied an unusually high place as a scientist, teacher and citizen. He was exceedingly popular among both young and old, a fact which was demonstrated in no uncertain terms at the farewell banquet which was tendered him at the University of Lund".

On his arrival in Ottawa Dr. Malte was attached to the Seed Branch, Dominion Department of Agriculture. During this period he spent the winter months reviewing the collection in the Herbarium of the Department of Mines, then in charge of Professor John Macoun. The summer of 1911 was spent in studying the flora of Canada in the field and in making large collections of plants in all the provinces of Canada. In 1912 he received his appointment as Dominion Agrostologist with headquarters at the Central Experimental Farm, Ottawa. The duties of the Dominion Agrostologist are considerably wider than the title might indicate, since the division of which he is in charge is responsible for the improvement and development of all forage crops suitable to Canadian conditions, which, owing to the size of the country, must necessarily vary enormously. In addition to the field work which was conducted at the Experimental Farm at Ottawa, Dr. Malte was responsible for conducting experiments and trials at the experimental farms and demonstration stations which are operated by the Department of Agriculture in every province of the Dominion. This naturally entailed a vast amount of correspondence, travelling, supervision of staff, handling of finances and other executive work.

One of the first, and perhaps the most important piece of work which Dr. Malte undertook, was the study of the natural hay and pasture resources of Canada from a botanical point of view. He was particularly interested in the genera *Poa*, *Agrostis* and *Agropyron*. Many of the projects which were initiated by Dr. Malte are still being carried on. To use

his own words, "vast collections of all kinds of flowering plants have every year been made, particularly in the Prairie Provinces and British Columbia". In addition to the work actually pertaining to the position of Agrostologist, Dr. Malte undertook the determination of large numbers of plants from all over the Dominion. These plants were received from other Departments, both federal and provincial, from universities, schools and private individuals. In the spring of 1920, on the death of Professor Macoun, he was appointed Honorary Curator of the National Herbarium. He held this position until November 1, 1921, when he was officially appointed as Chief Botanist, National Herbarium, Department of Mines. During this short period he classified and named large collections of plants from the Hudson Bay region, Lesser Slave Lake, Coast of British Columbia, Rocky Mountains and the adjacent plains. While still Dominion Agrostologist he co-operated with Professor J. Macoun and Mr. J. M. Macoun in the preparatfon of the *Flora of Ottawa*, and with J. M. Macoun in the compilation of the *Flora of Canada* published in 1915. In addition, in cooperation with Mr. G. H. Clark, Seed Commissioner, he published the revised edition of *Farm Weeds* (1909) and *Fodder and Pasture Plants* (1913).

When the position of Chief of the Division of Biology, Department of Mines, was made vacant by the death of Mr. J. M. Macoun, it was decided, since the work was entirely of a botanical nature, to change the classification of the position to Chief Botanist, National Herbarium. The appointment of Dr. Malte to this position met with the undoubted approval of all the interested people in Canada, for his reputation as a botanist, in particular as a systematist, had spread far and wide. His old friend Professor J. Macoun, father of the man into whose shoes Dr. Malte had stepped, wrote, "I consider from every standpoint that you are the only man in America fitted to take charge of the work that my son has left behind him. As regards fitness for the position, it is so plain to the public that it leaves me nothing to say, but knowing your scholastic attainments and your knowledge of Canadian field botany, I am free to say that no other man in America is so well fitted for the position as you are".

As Chief Botanist Dr. Malte made each year collecting expeditions to different parts of Canada, even to the Arctic Circle. He was especially interested in the *Gramineæ* and was largely responsible for the commencement of a small industry growing and harvesting the seeds of *Agrostis tenuis*, *A. canina* and *A. stolonifera* var. *compacta*, in the provinces of eastern Canada.

He was never too busy to give generously of his time and attention to the numerous serious students of botany who sought his aid in matters relating to their science.

He was an active member of a number of societies listed below:—

The Linnean Society of London, England.

The Botanical Society of America, Cambridge, Massachusetts, U.S.

The Ottawa Field-Naturalists' Club.

Fifth International Botanical Congress, Cambridge, England.

Fourth International Congress of Plant Sciences.

Canadian Forestry Association.

Professional Institute of the Civil Service of Canada.

Canadian Society of Technical Agriculturists.

Canadian Geographical Society.

Glenlea Golf & Country Club (Honorary Member).

W. R. W. & H. F.

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M. O. MALTE AS A SYSTEMATIC BOTANIST

By M. L. Fernald, Fisher Professor of Natural History, Havard University.

To me the death of Dr. Malte, just as he was reaching the point of great promise in his botanical work, is a tragedy. Coming to Canada with a ground-work in Systematic Botany which all educated Swedes so early acquire and with a special training at the University of Lund (where he had been Assistant in the Herbarium) which had fitted him for work on the floras of northern regions, Malte began his career in Canada at the Central Experimental Farm.

His doctor's thesis at Lund had been a study in embryology and cytology (published in 1910) and as early as 1902 he had published in Sweden a paper on cytology. Consequently the change, when he took up work at the Central Experimental Farm, was a rather drastic one, for his publications there had to do primarily with forage plants, and especially with the grasses of Canada.

Malte had scarcely established himself in the field of agricultural botany when the untimely death of the late J. M. Macoun made it advisable to transfer him from the Experimental Farm to the National Museum at Ottawa, where he started on a third career. The traditions of the Botanical Section of the Museum (formerly the Botanical Section of the Geological Survey) were those of exploration and work upon Geographic and Systematic Botany, primarily of the vascular plants.

Malte's training in Sweden and his natural contacts with the active group of Scandinavian botanists led him to concentrate his studies upon the arctic and subarctic floras of Canada. Although his field work extended from New Brunswick to Vancouver and he took over from J. M. Macoun the work upon the Flora of the Ottawa District, his heart was in the arctic work and he seized every opportunity to go on government boats on their cruises about Hudson Bay and through the Arctic Archipelago.

Collaborating with the late Prof. Ostenfeld, who, at the University of Copenhagen, had himself been a pioneer in drawing together the

vast scattered material on the arctic flora, and also engaging the co-operation of the distinguished Greenland scientist, Dr. Morten P. Porsild, Malte plunged into the work on arctic floras with a zeal and unflagging industry which all his friends at Ottawa quickly recognized. It soon became evident that, although some others might feel that the work on the natural vegetation and the agricultural possibilities of more habitable regions of Canada might well be stressed, Malte had found the field in which his greatest interest lay. For many years, partly with Ostenfeld and partly alone, he studied, revised and monographed the technical groups of vascular plants in the arctic regions of North America, a work in which his native language and his facility in other languages of Europe were invaluable aids.

The pioneer work on arctic floras carried on chiefly by expeditions from European centers and the very extensive literature on technical groups of the North in the works of Russians, Scandinavians, English and other European scientists made it necessary to check with precision the diverse results and to establish a co-operation by correspondence with the botanists at the centers where these older collections were preserved. Trips to the botanical museums of Europe and of the United States were made when possible for exact checking of identities, and the great files of manuscript which Malte had worked out give indubitable evidence of his industry and of the precision and caution of his work.

As I stated at the opening of this note, Malte's death is peculiarly tragic: the critical scholarship which he had developed and the very accurate notes on and revisions of northern plants which he had worked out had not reached completion at his death. Approximately one-half the manuscript on the arctic flora seems to have been completed except for minor details. Such matter in this extensive manuscript as proves to be entirely new and original is being drawn into final form so that at least a portion of Malte's scholarly conclusions can be salvaged.

From what I knew of him and his intense zeal in his work, I cannot help feeling that he was severely handicapped by two primary conditions which might have been altered. In the first place, he was isolated from others working in the same vast field, and it was only rarely (when he visited the larger botanical centers) that he came in touch with the fellowship of others whose work in his special subject had reached the same degree of technical detail. In the second place, Malte was forced at times to be his own servant. This is a common condition in too many scientific establishments, but, surely, when a man of real intellectual genius is forced to do the routine work which should fall to the lot of a technical assistant, it must be said that he is being handicapped in a way which would not be tolerated in a successful business house. Vast sums are spent by our governments and our educational institutions on subjects which have a practical appeal, but it is certainly a very short-sighted policy which loads upon a man of scholarship, ability, industry and genius the routine work which demands no special intellectual training.

In spite of the tremendous disadvantages under which he worked, Malte retained a cheerful and lovable spirit which all his friends recognized. It is possible that the temperament which could be always sweet and unresentful is just the one upon which impositions could be forced. One very important lesson should be drawn from Malte's willingness to load himself with routine when the important scientific work for which he was trained and which he yearned to do was being neglected; this is the imperative need of providing the competent and thoroughly trained specialist with sufficient routine help.

Although Malte's scientific publications are few, while the potential scientific results were many, his quick insight into the possibilities and the limitations of conditions in the North gave us a new technique in the collecting and preparation of specimens which is invaluable. Formerly, expeditions into remote territory found it necesary to burden themselves with vast bulks and weights of drying papers or "blotters" with which to prepare specimens. These bibulous papers had to be removed from the presses with clock-like regularity, and it often required 1 to 2 weeks of time-consuming routine properly to dry out a press of specimens. This cumbersome method was radically changed, for in his arctic trips Malte devised a short-cut which reduced the weight carried and the fruitless drudgery required and materially improved the specimens. Landing at a port for a short period, his technique was to gather everything in sight, putting each species into a separate paper or other separator and throwing all the collections into large burlap bags. When these were brought back to headquarters they were quickly sorted, laid out in the thin

specimen-sheets and dried between corrugated pasteboards (cut to size) without any of the driers or blotters which convention has prescribed. Care was necessary in the original laying out of the specimens, but after that nothing was needed but to stack the presses of specimens between corrugated boards in a dry and warm place, preferably in a current of warm air, and leave them until it was convenient to remove the specimens which, in 12 to 24 hours, were thoroughly dried, compactly pressed and usually with natural, rather than altered, colouring.

This vast improvement over the old technique has been rapidly adopted by those who are looking for advance, and it is mentioned here merely as an indication of the direct methods and the keen imagination which Malte displayed in all his work.

His loss is not merely a personal one to the many friends who loved him and who delighted in his genial personality, but also to the science of Botany in Canada and throughout the northern countries where his work strongly overlapped that of many contemporaries.

AN ONTARIO SAND-FALL

By HOYES LLOYD

ON Friday evening, December 15, 1933, at 4.30 p.m., it being then almost dark and snowing heavily I went from my office to the National Museum. Upon arrival there I mentioned to the editor of *The Canadian Field-Naturalist* that the sleety snow which was falling looked like sand. He asked if it really was a fall of sand and, since I was not sure, his query made further observation desirable.

On Saturday, December 16th, the icy crust of the snow was obviously pink or reddish pink in colour, its strange appearance being particularly marked in the open woods at my home, near Ottawa, and especially where paths had been shovelled exposing the pure white of the snow beneath. The colour was entirely in the uppermost inch.

On Sunday, December 24th, a square foot of crust was cut from an open space in my garden and was taken to the chemical laboratories of the Central Experimental Farm for examination. Mr. C. H. Robinson, Acting Dominion Chemist, has reported on it as follows:

"Pounds per acre suspended matter 9.16

Pounds per acre suspended matter after ignition 7.27

Pounds per acre mineral matter insoluble in hydrochloric acid 5.91

Pounds per acre mineral matter soluble in hydrochloric acid 1.36

Microscopic appearance—yellowish, very fine sand, becoming white and transparent on extraction with acid.

Analytical data on extraction with acid and microscopic appearance identify this material as very fine weathered sand."

The loss on ignition would include natural organic matter as well as soot from fuel burned in the locality.

The whole question was referred to the Dominion Meteorological Service, Department of Marine, and through the Director, Mr. J. Patterson, I have received the following statement prepared by Mr. Andrew Thompson of that Service.

"The fall of dust occurring at Ottawa in the late afternoon of December 15, 1933, was probably part of the dust fall that observers have reported taking place on the same day at Copper Cliff, Sudbury, North Bay, Sault Ste. Marie, Sparrow Lake, Muskoka, and at Montreal and Beauceville, Quebec.

"Although dust has been reported now, over an area extending 600 miles from east to west and 75 miles north to south, it is quite probable that the notes in the December reports from our climatological stations in Northern Ontario and Quebec will indicate dust fell over a considerably greater area. However at the present time a conservative estimate of the surface covered by dust would be 35,000 square miles. Assuming that this surface was covered with dust at the rate of 9 pounds per acre as found at Ottawa, the total amount of dust would weigh approximately 100,000 tons.

"Mr. C. D. Ferguson, Copper Cliff, Ont., has given the following account of the dust

fall occurring there. 'On December 15th last a hail and snow storm commenced about eight a.m. and continued off and on until shortly after twelve noon. Up until past mid-forenoon the hail and rain was white and clean. There then fell a very thin layer of mud-covered snow and hail. The hail which was in fair-sized ice crystals was distinctly stained a clay-like or mud colour. Also the layer of coloured snow was distinct and was not intermingled with the clear newly-fallen hail and snow beneath.' Mr. E. D. Clipsham of Sparrow Lake, Muskoka, sent me the mud collected in a square yard of snow falling about noon December 15th. A chemical and microscopic analysis of this sample has been made by Duncan R. Derry of the Geological Department of the University of Toronto, who has kindly given a short report of this analysis.

"*Microscopic Appearance.* — 'The material consists of a very fine dusty sand most of the fragments of which lie between .03 to .003 mm. diameter. Most of the grains are well rounded considering their small size.

Minerals. — Quartz is the commonest of the larger grains, in some cases stained or coated with iron oxide. Feldspar also occurs but less commonly. Glass occurs but forms only a small proportion of the whole. A green mineral may be chlorite. A yellowish brown mineral occurring rather commonly has not been identified. The finer material probably consist mainly of clay particles.

Organic Remains. — Diatoms of at least two species were seen. These are not common but a few have been found in nearly every examination. Other microscopic organic fragments are suspected but not positively identified. Some plant fragments, including part of the seed case of a grass, have been found. Not much weight is placed on these, however, as they might have been of local derivation, which could not be the case for any of the other materials.

Conclusions as to Origin.—From the above examination it would appear that the material which fell with the snow is dust picked up by high winds or tornadoes in some district beyond the limits of the snow-covered area where it fell. On the day in question (December 15, 1933) southerly winds prevailed. There had been, just previous to this, tornadoes, in Louisiana, Texas and other Southern States. It seems probable, therefore, that the dust was picked up by one of these and carried north by the southerly winds at a high elevation, until it was precipitated with snow in eastern Canada.

'The suggestion that the dust is of volcanic origin does not seem tenable. Volcanic dust consists largely of glass and the fragments are typically angular. Although a little glass does occur in the sample in question this is subordinate to the other minerals. The glass may have been volcanic originally but has probably formed part of a sand since its expulsion. Finally the presence of diatoms, which live in bodies of water, and the tests of which occur in many sands and clays, is an almost certain proof that the material could not be of volcanic origin.'

"An examination of the weather maps and especially the winds on the previous day indicates the probable direction from which the dust came. The synoptic map for 8 p.m. December 14, 1933, shows there had been strong southerly winds over Texas and the Gulf states with several destructive tornadoes reported in this region in the newspapers. The northern limit of the warm air was a line from Lincoln, Nebraska, east-south-east to Knoxville, Tenn. In the synoptic maps for December 15, 8 a.m. just 12 hours later, the warm air at the earth's surface had advanced about 500 miles north-easterly to a line through London, Ont., Cleveland, and the midpoint of Lake Michigan. At heights of five to twenty thousand feet above the earth's surface, warm air extended considerably north of this line causing snow at many stations in Ontario and Quebec. This warm air current appears to have carried with it a large amount of dust which could easily have been carried up to great heights in the tornadoes reported from southwestern United States."

"Such falls of earth and dust are not uncommon in America and Europe. On November 13, 1933, a considerable fall of dust was reported at Buffalo, N.Y., and on January 23, 1933, dust was reported falling with snow by numerous observers from Cobalt, Ont., to Lake St. John, Quebec."

It occurs to me that this widespread fall involving the dispersal of surface soil of one part of the continent over a distant section,

aside from the facts themselves, contains many interesting natural history implications. If seven or eight pounds of soil per acre could be scattered over a wide section in Ontario after having been picked up by the wind in the Southern States could not great quantities of bacteria, seeds, spores, and other living plant materials be scattered similarly miles from their home locality at the same time? Definite indication that this could occur is contained in the report of the findings of Duncan R. Berry.—5 March, 1934.

SOME 1931 BIRD NOTES FROM LONDON, ONTARIO

By E. M. S. DALE

IN *The Canadian Field-Naturalist*, 46:106, May, 1932, we gave an account of the interesting and unusual records made by the McIlwraith Ornithological Club, London, Ontario, during the year 1930. In view of the fact that the succeeding years have also produced some interesting events, it is proposed to deal, in this article, with those occurring during 1931, to be followed, perhaps, at a later date by those in 1932. Some of these happenings have already been recorded in the pages of the *Naturalist*. In such cases it will not be necessary to give particulars again and only reference will be made to the note with the date of the number in which the article appeared.

In order of date the first unusual record was made on March 22nd when a Glaucous Gull and an Iceland Gull were observed at Port Stanley, on the north shore of Lake Erie, some thirty miles south of London. A note on this was published in the *Naturalist*, 46:49, February, 1932, "Iceland Gull on Lake Erie", by W. E. Saunders.

Early April is the time we look for migrating ducks, and owing to the fact that there are no bodies of water large enough, or sufficiently protected, to make them feel safe, they usually keep pretty well on the move and it is necessary to be very alert to see and identify all the species which pass through. Some ten or twelve varieties are fairly regular and are noted in larger or smaller numbers each spring even though the ponds and rivers are rather too small to be very attractive. One of the rarer ducks listed in 1931 was the Greater Scaup, one having been observed at the "Ponds" on April 5th. It was in company with a Lesser Scaup and the difference in the colour of the head was seen in splendid light with the aid of a telescope. On April 7th another (or possibly the same one) was noted at the same place.

The Gadwall is another of the rarer ducks, in fact one which has been on the county list for only a very few years. On April 9th a flock of five was found at the "Ponds". They were rather wild and we had difficulty in getting close enough to them to observe them satisfactorily. The white speculum, pointed wings, swift flight, colour and size, left little doubt, however, as to their identity. On April 11th there were three, and on April 12th one, at the same place. This is the greatest number of occasions, also the largest number of birds of this species observed to date.

On April 10th we had a splendid view of two pairs of Shovellers at the "Ponds". They were at the north side and the intervening shoulder of a hill concealed our approach so that they did not see us until we were very close. They did not become greatly alarmed even then but swam quietly out into the open water giving us every opportunity to observe them at leisure. This is only the fourth or fifth occasion that this species has been reported from Middlesex county.

Although early April is, as has been already mentioned, the time of the main flights, smaller numbers continue to drift in from time to time, sometimes even up until the end of May. One of the rarities that arrived during this period was the White-winged Scoter. Two birds were found at the "Ponds" on May 7th, by C. G. Watson, constituting our first spring record for the species. The next day he saw one at the same place also, but whether it was one of the birds of the previous day or a different one we cannot, of course, tell.

The next bird to be mentioned is the Pectoral Sandpiper which appeared in most unusual numbers during the spring migration. While fairly common in the autumn these birds have been rarely noted in spring, we understand, at any place in Ontario. Mr. W. E. Saunders has covered this occurrence in his article "Spring Rec-

ords of Pectoral Sandpipers at London, Ontario", which appeared in *The Canadian Field-Naturalist*, 46:190, November, 1932.

Henslow's Sparrow, which we had found along the lake shore near Port Bruce in 1930, was found in 1931 in quite a number of localities in our own county. First noted near Komoka on May 16th, they were, later in the season, seen or heard at some four or five other places in various directions from the city. Although the song of this species is insignificant and might very easily be overlooked, we hardly think this has been the case but rather that the numbers noted in 1931 indicate an extension in the range.

During the winter of 1930-1931 a Carolina Wren was reported by a correspondent in Ingersoll and we went down several times to see (and hear) it. Later in the season, on May 17th, one was in full song at Wonnacott's farm, about 14 miles west of London. It is several years since one of these birds has been reported from our district.

On May 19th a Black Tern visited the "Ponds". This is also a species that favours us with only a passing visit once in every two or three years. It is a handsome bird and the unusual and striking colours make it a very welcome sight.

The warbler season usually produces something of interest and 1931 was a year of very special note. On the morning of May 24th we went to the "Golden-wing Woods", about five miles west of the city, (London), arriving about 7 o'clock. It was fine and bright although there was a cold north wind blowing. We found birds in good numbers, however, towards the south and east where they received some shelter and warmth. After going pretty thoroughly over the bushes there we struck north and while following a path through an open piece of woods trying to get a satisfactory look at a small flycatcher, we happened upon a male Hooded Warbler. The species was one that two of the party had never seen before but we were familiar with its appearance from coloured plates and one look at the striking head pattern left no doubt as to what it was. It remained in the low branches of the trees where we found it, for five minutes or more, and gave us every opportunity of examining it thoroughly. It sang several times, finally flying away uttering a loud *chip* as it did so. This is the second record for this species for the county.

Our find of the "Hooded" was however, decidedly outclassed by the taking of a maleKentucky Warbler by A. A. Wood at Strathroy the next day, May 25th. There are only three Canadian specimens of this bird, two of them having been taken in Middlesex County. An account of this appeared in *The Canadian Field-Naturalist*, 46: 209, December, 1932, "A Kentucky Warbler at Strathroy, Ontario", by A. A. Wood.

The next rare warbler was the Yellow-breasted Chat on May 27th. One of these is recorded about every second or third year, usually remaining for a day or two and then passing on. The 1931 bird, however, was again seen on June 15th evidently having decided to stay. The wood where it was found is locally known as the "Golden-wing Woods" and with one exception all the Chats from the London district have been found within its confines.

The Prairie Warbler is a very rare and irregular visitor never having been known to nest or even spend the summer here, although, as in this particular instance, one is occasionally seen at a date rather late for a migrant. The 1931 visitor was first heard on June 19th and again on July 1st. Subsequent trips to the locality, however, failed to produce the bird, whose song is quite characteristic and easily recognized.

On June 26th a Clay-coloured Sparrow was located just outside the south-eastern boundary of the city beyond the Vauxhall bridge. Its presence was immediately made known and as it remained in the vicinity for a number of days the majority of the active field men of the Bird Club were able to see it. The "Clay-colour" is now reported nearly every year from some point in Western Ontario and it is possible that this species, too, may in time increase its range spreading eastward until it is of regular occurrence.

After some rainy weather, W E. Saunders found, on August 11th, a small pool at which some waders had gathered. Included in the number was one Stilt Sandpiper, a very rare bird in our vicinity, or at any rate one that is very seldom identified or reported. Unfortunately the pool was a very temporary one and did not yield any other records of interest.

As an "extra" at the Bird Club corn roast on September 19th an adult Black-crowned Night Heron flew along the the river near Byron bridge alighting in a tree on the opposite shore a few hundred yards up-stream from our camp fire. This was the only record of this bird for the year, in marked contrast to 1930 when quite a number were noted at about the same locality.

SOME NOTES ON THE PRAYING MANTIS

By C. B. HUTCHINGS

Assistant Entomologist, Department of Agriculture, Ottawa, Ont.

THE FOLLOWING INQUIRY was received at Ottawa in August from a farmer at Ameliasburg, Prince Edward County; "Will you please identify the enclosed insect? Is it harmful and what are its habits? My son found it in the garden and another one on the binder-table. The boys say they have noticed quite a number about. I do not remember ever seeing one before".

In reply, he was informed that the specimen was a Praying Mantis, *Mantis religiosa* L., and was a beneficial insect. While not a native of Canada it had been reported previously from Kingston and that district.

Shortly after this the Belleville newspaper *Intelligencer* of August 19th, gave an account of several mantids being picked up on the streets at the lights; and on that same day notice appeared in the Peterboro *Examiner* that a strange insect, identified as the Praying Mantis, had been found on one of the city streets.

About this time a letter came from Mr. A. B. Baird, in charge of the Parasitic Laboratory at Belleville, offering me specimens of the Praying Mantis for exhibition purposes. He said "this insect has become increasingly abundant during the past four or five years, and two years ago it was so numerous in Prince Edward County that one farmer brought in over 100, which he collected while putting on a load of hay. This year it was again reported in large numbers there and also in the lower part of Hastings County, particularly around Belleville where large numbers could be collected in a single evening feeding on Mayflies and other insects around the lights and lighted windows of garages and stores on Front Street."

It would appear from the foregoing that this species of Mantis is able to withstand the Ontario winters and has now become well established in that province.

I understand that attempts have been made to breed the Mantis in the Eastern States of America, but without success, these insects not being able to survive the winters there.

The Mantidæ are classified under the raptorial or grasping Orthoptera. They are exclusively predacious in habit. From a point of size, they are large insects, some species attaining a length of four inches. The head is so attached as to be capable of being moved freely from side to side. The prothorax is very long and bears the grasping legs, the fore ends of which double over on to a row of spines on the underside of the thighs, something after the style of the folding blade of a pen knife, forming a very efficient instrument for holding the prey. The eggs are deposited in masses and overlaid with a thick silky material which quickly dries and hardens. The cases are usually found attached to twigs and small branches of shrubbery.

On account of their peculiar attitudes and motions they have earned for themselves odd names such as soothsayers, camel crickets, devil horses, prophets, mule killers, rear horses. The term "mule killer" has been given on account of the absurd superstition that the dark coloured saliva they eject is fatal to the mule; that of "rear horse" because of the long slender prothorax which gives them a resemblance to tiny giraffes. Their most popular name is "praying mantis" on account of the strange habit of clasping the front legs together before their meek-looking faces, and raising these as in an attitude of prayer, which makes them appear very pious fellows. Such, however, is not the case. They are exceedingly ferocious, stealthy and hard fighters, and will engage in mortal combat with any insect that comes their way.

The mantis are mainly found in the Tropics where they reach their greatest development and include some remarkable forms.

In the United States there are about 15 or 20 species, for the most part found in the South. The common species, *Stagomantis carolina* L., is native to the states of New York, Pennsylvania and Ohio. It attains a length of 2½ to 3 inches, and is often to be seen about barns, sheds and houses, quietly waiting for some unwary insect to come within its reach Then with one quick motion it seizes its prey and devours it greedily. Another species is *Paratenodera sinensis* Saus., the Chinese mantis, which has become established near Philadelphia. It is one of the larger kinds and reaches a length of 4 inches.

A European species, *Mantis religiosa* L., was introduced into New York State in 1899. It has since become well established near Rochester and is quite common there. It is this same species which is now being found in Prince Edward County and, in all probability, it became originally from New York State from where it gained entrance into Canada likely with the traffic across Lake Ontario.

The Mantis feeds on caterpillars, flies, crickets, grasshoppers and other insects. It prefers to take its prey alive rather than eat dead insects. I had a large specimen under observation for three months this summer. We kept her in a glass jar where she remained quiet most of the time, resting on some small twigs. She was fed on house flies, moths and an occasional cricket. When these were introduced into the jar she became very alert and soon pounced upon them and despatched them greedily, nipping off the wings before starting to eat. It made no difference what end of the unfortunate victim she began on, it was all the same. After the meal she would clean herself, carefully preening the spines of the front legs and removing any small bits of food that remained there. Sometimes we put her out on the table near a fly and watched her impale it with a lightning-like blow. She had the habit of scratching her head with her front feet. This was very comical and caused us much amusement. Towards the last it was difficult to find flies for her and after ten days without food she gradually weakened and died.

I recently came across an extract from a book written this year by Léon Binet, Professor of Physiology, of the Faculty of Medicine in one of the universities of Paris. Under the heading *Dramatic Nuptials* he writes, "The males of certain spiders and insects are devoured by the female during the last stage of nuptials. Typical in this respect are the habits of the praying mantis", and he goes on to quote several interesting experiments he made:—A female mantis was put into a small cage and a male then introduced. As he approached the former she immediately attacked him and snapped off his head. Beheaded but not discouraged the gallant male continued his courting. Marriage took place, but on the morrow he was devoured by his wife.

In another case, a second female was introduced into a cage with a male and female already there. The intruder immediately separated the couple, engaged in a fierce struggle with her rival and subdued her. The terrified male retired into a corner from where he watched the intruder calmly devour his mate. When she had finished she turned her attention to the male. The ogress forced him to come out of his retreat, snapped off his head, married and then devoured him.

The famous French naturalist, Henri Fabre, reports a case of a female Mantis which killed and ate no less than seven males, one after the other.

Truly the female of the species is more deadly than the male!

NOTES ON BIRDS OF THE LABRADOR PENINSULA IN 1931, 1932 and 1933

By HARRISON F. LEWIS

THE PERIODS that I spent on the southern shore of the Labrador Peninsula, or north shore of the Gulf of St. Lawrence, between Shelter Bay and Blanc Sablon, in Saguenay County, Quebec, during the years mentioned in the title of this paper were as follows:

1931—June 19th to August 1st.

1932—June 10th to September 1st.

1933—June 10th to August 31st.

Daily records of ornithological observations were kept during these periods, in accordance with my usual custom. From these records the following notes have been extracted and prepared for publication.

The names of species which have not hitherto been recorded in the Labrador Peninsula are marked herein with a *.

In the summer of 1932, particularly in the latter part of July and in August, there was a very pronounced and unusual scarcity of small fish, especially of the capelin (*Mallotus villosus* L.), alone much of the coast referred to. As a result, presumably, of this scarcity, the Gulls of the region, which are accustomed to use these small fish to a large extent as food for adults and young, suffered severely. They could not substitute offal from the cod-fishery for the small fish, as they sometimes do, because the cod, which are themselves feeders upon capelin and other small fish in these

waters in summer, were also scarce and few were being taken by the fishermen. At every low tide in daylight hours adult Herring Gulls (*Larusa rgentatus smithsonianus*) and Great Black-backed Gulls (*Larus marinus*) were to be seen on sheltered shores, seeking sea-urchins, winkles, and other shell-fish, whose shells they broke open by dropping the creatures upon bare rocks from a height of a few feet, so that they might secure and devour the contents. Apparently they obtained enough food by this means and by eating wild berries of various kinds to keep themselves from starving, but not enough for the needs of their growing young, which died in large numbers, as did also the young of Ring-billed Gulls (*Larus delawarensis*) and Caspian Terns (*Hydroprogne caspia imperator*).

About the end of the first week in August conditions for these birds had become so bad on the coast between Harrington Harbour and Fog Island, where I was at the time, that very few living young of Herring Gulls and Great Black-backed Gulls could be found on the numerous islands on which these birds had nested, while dead young of these species were scattered over the islands everywhere. In a colony of 400 or more adult Ring-billed Gulls on a small island near Pointe au Maurier, which is in the region just refered to, large numbers of dead young were seen lying about on August 6th, although more than 100 young of this colony were still alive on that date. From the little piles of fresh berries which the parent birds had just brought to their young, as well as from the nature of the excrement of the latter, it was evident that these young Ring-billed Gulls were at that time being fed chiefly on ripe fruits of bog bilberry (*Vaccinium uliginosum* L., varieties).

The dead young Gulls of all three species mentioned usually showed many severe wounds on the back of the head, apparently caused by blows from the beaks of other Gulls. Similar marks were frequently seen on those young Gulls that remained alive. Residents of that coast commonly believe that, when, owing to a general scarcity of their staple food, the parent Gulls find themselves unable to provide sufficient nourishment for their young, they deliberately kill some or all of the latter by striking them on the back of the head with their beaks, thus lightening their own labours in supporting a family and putting their off-spring out of misery. It is, however, well known that if, at any time, young Gulls stray from the territory of their own parents into the territory of other adult Gulls in the same colony, the birds on whose territory they thus trespass frequently drive them away, and, in so doing, strike them recklessly on the back of the head, with a severity that is often fatal. When food is scarce, the hungry young Gulls are probably tempted to trespass on their neighbours' territories far more often than usual and to beg food from adults other than their own parents, while, at the same time, the adults may be more irritable than usual in preventing trespass on their territories and in guarding for their own young whatever food they succeed in bringing home. These conditions, together with a lessening of the powers of resistance of the young as a result of insufficient nourishment, may bring about a great increase in the mortality of young Gulls that is incidental to their being struck for trespassing. It is also possible that the young birds may strike one another severely when quarreling over their slender supply of food.

In the summer of 1933 capelin were abunddant along the coast in question and the Gulls that nested there raised large numbers of young with little loss from any cause.

The spring of 1933 was unusually late and cold on the north shore of the Gulf of St. Lawrence and in consequence the termination of the spring migration was delayed. The observation of an Eastern Yellow Warbler (*Dendroica æstiva æstiva*) and a Yellow-bellied Flycatcher (*Empidonax flaviventris*) on June 24th on Cove Island, a bare sub-arctic island about 13 miles southwest of Harrington Harbour and 4 miles from the mainland, is believed to indicate that the migration was still incomplete on that date, as these individuals were presumably transients, since this island has no environment suitable for the nesting of these species.

Phalacrocorax carbo carbo. EUROPEAN CORMORANT.—The privately protected colony of this species on the cliffs of Lake Island, near Cape Whittle, continues to show an encouraging increase. The following is a record of the numbers of occupied nests of these birds that I counted in this colony on the respective dates stated.

June 15, 1930[1]	63
June 29, 1931	70
July 7, 1932	97
June 23, 1933	112

[1] See *Can. Field-Nat.*, 45:113, where, owing to a typographical error, the year is written "1900".

A new colony of this species has begun on Cliff Island, in St. Mary Islands Bird Sanctuary, 20 miles northeast of the Lake Island colony, of which it is probably an off-shoot. The nests in the new colony are placed on ledges on a vertical cliff about 50 feet high. European Cormorants were first observed to nest at this place in 1930, when several nests were built. These, being too far down on the face of the cliff, were all destroyed by the sea during a storm. They were not replaced that year. The poor judgment shown in placing these nests where they could be destroyed in this way suggests that this new colony was founded by inexperienced birds, which had just reached breeding age and were nesting for the first time. They could not have nested on Cliff Island previously, as the island is observed closely at frequent intervals during the summer by the caretaker of the bird sanctuary in which it lies.

In 1931 there were 4 occupied nests of European Cormorants on Cliff Island. All of them were built high above the sea, where they were safe from the waves, but accessible to man. They received the protection of the bird sanctuary and were not disturbed in any way, and the young in them were reared safely.

The next year this colony contained 5 occupied nests, which were in positions similar to those used in 1931, and which young were successfully raised. As individuals of this species do not breed in the first year after that in which they are hatched, the additional pair of birds that nested here in 1932 could not have been hatched in this colony on Lake Island, which is the only other colony of this species known to be on this coast.

In 1933 the Cliff Island colony contained 13 occupied nests, in which young were raised. The increase in the colony in this year, as compared with its size in 1932, was 8 pairs, or 16 breeding birds, and, as less than that number of young were reared in this colony in 1931, it is evident that in 1933 the increase again included birds not hatched in the colony

It may be pointed out that the colony of European Cormorants on Lake Island is still far below its size of a century ago and that there are still many unoccupied ledges on the cliff on which it is built, so that the establishment of the new colony on Cliff Island cannot be due to over-crowding in the older colony.

I have published elsewhere[2] a record of a European Cormorant, banded as a nestling, that returned when adult to nest in the colony in which it was hatched. The founding and early growth of the colony on Cliff Island provides instances of a different course of action by individuals of this species.

Clangula hyemalis. OLD-SQUAW. — On July 10, 1933, I saw, on a pond on Grande Passe Island, near St. Augustin, two adult females of this species and an adult male in the so-called "winter" plumage. Residents of the vicinity tell me that the Old-squaw nests frequently on this island, but I have yet to obtain proof that it does so.

Somateria mollissima dresseri. AMERICAN EIDER. — This species continues to be an abundant breeder on this coast, although, on account of a scarcity of small fish in the summers of 1931 and 1932, especially in the latter year, unsually large numbers of downy young Eiders were eaten by Great Black-backed Gulls, which are driven by hunger to prey upon these young Ducks when their usual food supply of capelin and other small fish is scarce or wanting. In the summer of 1933 capelin were plentiful and both Gulls and Eiders throve.

A commercial eider-down industry was begun on a small scale under government supervision, in this region in 1933. One important feature of the system adopted is the leasing of groups of islands by the provincial government to private individuals, resident locally, for the purpose of attracting Eider Ducks and gathering eider-down on such leased areas. It is believed that this arrangement will provide increased protection for breeding Eider Ducks along this coast. Actual experience with these new conditions in 1933 gives support to this view.

An unusual display of courage and combativeness by a mother Eider was observed near Pointe au Maurier on July 17, 1931. An adult Great Black-backed Gull succeeded in seizing a small young Eider Duck from a family group, consisting of an adult female duck with her young, that had been scattered in a sheltered channel by the pasage of the motorboat in which I was traveling. He alighted with his prey on the summit of a gently-sloping insular rock which was about ten feet wide and rose about a foot above the water. After such an occurrence it is usual for the mother of the victim to turn her attention to gathering her remaining young together and shepherding them away from the vicinity, while she utters a series of indignant croaks, but

[2] *Bird-Banding*, 2: 33 and 128.

this particular mother duck seemed to be filled with fury. Without an instant's hesitation, she splattered over the water to the edge on the rock on which the marauding Gull stood and ran at full speed up the slope, with head lowered and beak outstretched, to attack it. The Gull did not defend itself, but immediately flew away, and the Duck followed it no further As our motorboat was rapidly drawing from the scene of action, I was unable to observe whether or not the mother duck's attack caused the Gull to release the duckling that it had seized.

Oidemia americana. AMERICAN SCOTER.—A flock of Scoters that were feeding on sandy bottom close to shore at Musquarro on July 4, 1932, was studied carefully at leisure with X6 binoculars and the individual birds in the flock were identified without difficulty. There were about 50 American Scoters, most of which were drakes, although several were females. Eight White-winged Scoters (*Melanitta deglandi*) and about 20 Surf Scoters (*Melanitta perspicillata*), which are much more common species than the American Scoter along this coast in summer, made up the rest of the flock.

Circus hudsonius. MARSH HAWK—One was seen by me at the Agricultural Illustration Station at the mouth of Cross River, about 7 miles west of Harrington Harbour, on August 22, 1933. I was also shown the decaying remains of one that had been killed with a stick at the same place about two weeks earlier. This Hawk had struck down an adult Plymouth Rock hen. When a woman with a stick in hand, rushed up to it, as it guarded its prey, it kept one foot firmly planted on the hen's head and defiantly stood its ground, with the result that it was slain at the first blow. The hen, it may be noted, recovered from the attack, except that it lost the sight of one eye.

The Marsh Hawk has apparantly not been recorded hitherto on this coast east of Natashquan, where it was found by Dr. C. W. Townsend in 1912,[3] and where I frequently observed it in May, 1928. The mouth of Gross River is about 100 miles east of Natashquan.

Lagopus lagopus albus. WILLOW PTARMIGAN —On Grande Passe Island, near St. Augustin, two cock birds of this species were seen, some distance apart, on July 10, 1933. Residents of the vicinity told me that Willow Ptarmigan nest annually on this island.

Fulica (sp. ?). COOT.—On August 8, 1932, I flushed a Coot from a pond on Fog Island. The bird flew to the salt water and alighted on it near the shore of the island. I studied it for about ten minutes at short range with X6 binoculars, but, as it was in a bird sanctuary, I could not collect it. It was easily identified without question as a Coot, the dark head, neck, and shoulders, the gray wings and body plumage, the white line on the rear edge of the spread wings, and the white bill and frontal shield being seen very clearly, but it must remain uncertain whether this bird was an American Coot (*Fulica americana americana*) or a European Coot (*Fulica atra atra*), as none of the slight difference between these two very similar species were observed. Both of them have been recorded with certainty, based on specimens collected, from eastern Labrador, the American Coot by Wells W. Cooke[4] and the European Coot by Dr. O. L. Austin, Jr.[5]

In June, 1928, Mr. Frank G. Jones, and other residents of Wolf Bay, near Cape Whittle, on the north shore of the Gulf of St. Lawrence, described carefully to Dr. Arthur A. Allen and me a strange bird that had been found at Wolf Bay in the late autumn or early winter of 1927. Unfortunately, this specimen, which had been saved in the flesh to show to me in the spring, had been found and destroyed by the dogs of the settlement a short time before my arrival, but the description given us was so clear that Dr. Allen and I agreed that the bird must have been a Coot, although we received no information that would enable us to decide whether it was the European bird or the American. It should be noted, however, that it was found at about the time when the two specimens of European Coot recorded by Austin were taken on the eastern coast of Labrador, which is the time of the great and extraordinary flight of Lapwings (*Vanellus vanellus*), with a few other Europeon Birds, to Labrador and Newfoundland.

Apart from this Coot found at Wolf Bay late in 1927 and the one that I saw on Fog Island on August 8, 1932, I know of no other occurrences of any Coot on the north shore of the Gulf of St. Lawrence.

Charadrius melodus. PIPING PLOVER. — A pair of Piping Plovers which, by their notes and actions of distress, indicated that they

[3] *Auk*, 30: 6.

[4] *Auk*, 33: 164.

[5] *Auk*, 46: 208.

had a nest or young in the vicinity, were seen by me on a sandy flat southeast of Natashquan village on June 29, 1932. It would appear that the small breeding group of this species first discovered at Natashquan by Dr. C. W. Townsend and A. C. Bent in May, 1909, is still maintaining itself.

**Philohela minor.* AMERICAN WOODCOCK.—As I was walking slowly and carefully through a dense growth of waist-high vegetation, made up chiefly of angelica (*Angelica laurentiana* Fernald), cow parsnip (*Heracleum lanatum* Michx.) and nettle (*Urtica viridis* Rydb.), that hid the mouths of many Puffin burrows on the upper part of Bald or Gun Island, in Betchouane Bird Sanctuary, about 17 miles east of Havre St. Pierre (formerly Esquimaux Point), on July 27, 1933, an American Woodcock suddenly sprang straight up out of the mass of vegetation, some 6 or 8 feet from me, in the direction away from the sun. On whistling wings it flew about 50 yards at a height of about 10 feet, then dropped down into the dense cover. Efforts to flush it a second time were futile, as might have been expected, for in that dense plant growth, hiding rough and uncertain footing, the Woodcock could move about on foot much more rapidly than I could, and would remain unseen while it travelled in this way. Although my view of it, when it flushed as described above, was brief, the bird was close to me in favourable light and its shape, colour, size, long bill, and manner of flight were all so clearly observed and are so distinctive that I have no doubt at all as to its identity.

This is the first definite record of the American Woodcock in the region of the Labrador Peninsula, although Townsend and Allen include this species hypothetically in their list of "Birds of Labrador".[6]

Calidris canutus rufus. AMERICAN KNOT.—A group of three individuals of this species was seen on June 13, 1933, on the shore of Bald Island, in Betchouane Bird Sanctuary, mentioned above. These birds were clearly observed with X6 binoculars at a distance of 30 feet, and their size, clear rufous underparts, light-coloured upperparts, and bills estimated at the time to be between 1¼ and 1⅓ inches, in length, were carefully noted. When they flew their dark-barred upper tail-coverts and a light streak along the middle of each wing were seen.

This species is rare on the north shore of the Gulf of St. Lawrence, and this is my only observation of it in that region.

[6] Proc. Boston Soc. Nat. Hist., 33: 347.

To be Concluded

NOTES AND OBSERVATIONS

Ajuga genevensis L. — ERECT BUGLE, IN CANADA — Two straggling patches of this unfamiliar plant were found on June 15, 1934, in an old pasture adjoining the building of Mr. Wilfred Cass, L'Orignal, Ont. In company with Mr. John McLeod, District Weed Inspector for Eastern Ontario, an extensive infestation of Leafy Spurge believe to have originated in a neighbouring garden, was being visited. The presence in this pasture also, of such escapes from cultivation as Purple Columbine and Moneywort lends colour to the suspicion that all alike were introduced through the horticultural efforts of the same enthusiast.

The strict upright habit, bright blue spikes of flowers, and distinctive leaves at once proclaimed something new. The colony formation suggested spread by creeping rootstocks, which on digging was found not to be the case. Each plant in these few square yards possessed its own tuft of roots. The stems measured only a few inches in height, but in the other colony clustered closely along a stone fence, were nearly a foot high.

In the botanical manuals the range of this adventive European species is given as Maine or New England to New York and Pennsylvania. Another species, *Ajuga reptans* L. is known from Quebec, where it was reported, "Sparingly *introduced* in fields near Montreal. (MacLagan)", in Macoun's Catalogue of Canadian Plants, 1884. If other localities are known in Canada for either of these species, any report on them for incorporation in the Canadian Weed files, would be gratefully received.—HERBERT GROH, *Central Experimental Farm, Ottawa.*

WAS THE INTRODUCTION OF THE MUSKRAT TO GRAHAM ISLAND, QUEEN CHARLOTTE ISLANDS, UNWISE?—In the spring of 1933, during an investigation of the seaward migrating fry of pink salmon, *Oncorhynchus gorbuscha*, an occasion arose which drew the writer's attention rather forcibly to the question of the introduction of Muskrats to Graham Island. Apparently these animals were first brought to a place near New Massett by Mr. A. D. Hallett. Since he has left the area, no definite data can be found as to the exact time and number of the introduction. Fairly reliable information, however, shows that about fifteen individuals were released in late 1924 or early 1925. Since that year other persons have made introductions in a purely private capacity. About the latter it is difficult to obtain specific details. The important feature in any event is that from comparatively small beginnings, the species has spread widely and increased greatly in numbers.

On the night of April 25, the men in charge of the fence which had been established by the Biological Board of Canada for the enumeration of pink salmon fry, reported that a Muskrat made five or six sallies from beneath the river bank to the fence, rested against the screens and ate ravenously of the small fish. This behaviour was continued almost every night for several weeks in spite of the efforts which were made to frighten the animals away.

Our surprise was great that these animals should have spread in such a comparatively short time over rough country at least thirty miles from the nearest point of introduction known to us. That they should resort to fry as a regular article of diet was interesting in that it showed that unwittingly another name had been added in this area to the list of salmon enemies which was already long.

It might be noted as well that reliable reports have been forthcoming of damage to dykes in the Tlell River area. These structures were raised by the farmers to prevent inundation of their meadows by salt water.

In view of the observations reported herein, the question naturally arises as to whether the introduction of Muskrats to this new area was wise. Perhaps if the behaviour reported is general throughout the new environment, the revenue received from the exploitation of the species for its pelts, will not compensate for the damage done in the various respects. —A. L. PRITCHARD, *Pacific Biological Station, Nanaimo, British Columbia.*

AN ESCAPED RED-BREASTED GOOSE, *Bernicla ruficollis* FROM JAMES BAY.—An interesting specimen came in to the National Museum of Canada this summer (1933), forwarded by Corporal E. S. Covell of the Royal Canadian Mounted Police, in the shape of a high plumaged Red-breasted Goose, one of two, reported as male and female, taken about May 30, near Moosonee (né Moose Factory) at the bottom of James Bay, Ontario. From a "record" standpoint a disappointment lay in the fact that upon its leg was a numbered aluminium band asserting that it came from the Kellog Bird Sanctuary, Augusta, Michigan. On inquiry at the Sanctuary it appears that it cannot be determined just when these birds escaped from the enforced tenancy of their Michigan home to wander freely over the wilds of the continent but they were known to have remained there at least until the April previous to capture and had enjoyed something over a month of freedom.

The bird received was in perfect plumage with feathers unbroken, unworn and clean, without apparent trace of domestication and seemed to be a perfectly normal, healthy wild bird. If it had not been for the band on the leg this specimen would certainly have been considered as basis for an addition to the American bird-list.—P. A. TAVERNER, *National Museum of Canada, Ottawa.*

THE WHITE-TAILED JACK RABBIT IN MANITOBA. — The Royal Ontario Museum of Zoology has received from Mr. Sam Waller of Gypsumville, near Lake St. Martin, Manitoba, a specimen of the White-tailed Hare, *Lepus townsendii campanius* Hollister. Mr. Waller reports that these animals have been working their way northward during the last few years. About three years ago they were reported at Fairlord, twenty-two miles south of Gypsumville and this year appeared in the latter area. In January, 1934, they had reached a few miles north of the latter place.—J. R. DYMOND.

BLACK CRAPPIES IN BRITISH COLUMBIA. —The present record of *Pomoxis sparoides* (Lacépède) from Hatzic Lake, a backwater of the Fraser River near Mission, is believed to be the first from British Columbia. On June 14, 1933, three specimens were submitted to the Pacific Biological

Station for indentification by Mr. A. G. Bolton who reports them to be abundant in that body of water. They probably represent the result of transplantation, although no record of the introduction is at hand. The following particulars confirm the identification and indicate that there may be a slight retardation in growth rate in Crappies in the Fraser sloughs as compared with those from the central States (Hile R. 1931. *Rate of Growth of Fishes in Indiana.* Dept. Conservation State of Indiana, Pub. 107. Luce W.M. 1933. *A survey of the Fishery of the Kaskaskia River.* Ill. Nat. Hist. Surv. Bull. Vol. XX, art. III, (White Crappie). This appearance may be in part the consequence of no growth having taken place during the season in which the fish were captured.—JOHN LAWSON HART, *Pacific Biological Station, Nanaimo, B.C.*

Total length A	Length to end of vertebral column B	Head in length B	Depth in length B	Dorsal rays	Anal rays	Scales	Sex	Age
208	170	3.1	2.3	VII, 16	VI, 18	39	Female	IV?
177	145	3.1	2.2	VII, 15	VI, 20	41	Female	III
165	130	2.9	2.1	VIII, 14	VI, 17	41	Female	III

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WILD LIFE IN THE THELON RIVER AREA, NORTHWEST TERRITORIES, CANADA

Notes by the late JOHN HORNBY

The late Mr. John Hornby was well known as a traveller in Canada's northern lands for about two decades. On one of his trips in the Thelon River country, lasting from the early summer of 1924 until the autumn of 1925, he was employed by the Department of the Interior as a part-time investigator, in order that his observations, especially respecting wild life, might be placed on record. In his report Mr. Hornby did not confine himself to the period above mentioned but in some cases recorded what he had observed as far back as 1908. The portions of this report dealing with wild life are here published with the permission of the Department of the Interior.

NOTES ON WILD LIFE

Barren Land Caribou—*Rangifer arcticus.* (Richardson)

IN summer, Caribou to a great extent feed on any available grasses and in winter chiefly on moss. Evidently the latter is not entirely cleaned up in any special area for the following year or even later in the same year Caribou may again be seen feeding on the same area. Although these mammals still wander in herds their habitat is now becoming more restricted. The largest bulls, when at the peak of their condition at the end of September, weigh about 300 pounds. The back fat, which is the fat cut from the back, weighs 25 pounds.

The migrations of the Caribou appear to be irregular and these irregularities are caused by interferences with instinctive migrational courses, by natives, by large lakes not being frozen over, or by sections of the country having been burnt; otherwise I find that the migrations would be as regular as the seasons. On one occasion I noticed that thousands of Caribou had halted at the edge of Dease River, Great Bear Lake area, and then turned back on account of glare ice. However there are very few places where the Caribou cannot go, since they swim across lakes and rivers at the swiftest points, go up and down steep places and even cross lakes on glare ice.

Unlike most other species of deer the male and female Caribou may be seen together at many times of the year but it is only because they happen to be moving in the same direction. As a rule it is the third week in August before the skins are good and the animals fat. The young Caribou are very small but can swim perfectly and travel very quickly. Black Flies [*Simulium* sp.] at this season are in myriads and keep the Caribou constantly on the move when they may be seen travelling for days in small bands ranging from ten to several hundreds. During the summer, bull Caribou are always to be found along the barren points of the lake and high ridges and on the islands close to Hunter's Bay, Great Bear Lake, where they get some respite from the flies.

In July the Mosquitoes [*Culicidæ*] are bad and at the beginning of August the Black Flies troublesome. By the end of August Mosquitoes have disappointed but the Black Flies last well into September, although they are not so bothersome as the nights are drawing in and the weather is colder. During the first real cold spell about the beginning of October the mating season commences. The Caribou at that time congregate in countless herds at the edge of the woods on the barrens and the bull Caribou, which are magnificient looking animals, come out of the woods. After a little fighting and the consequent clipping of the horn tips they generally move off in a north-easterly direction in small bands of one bull and from 2 to 20 cows following. Towards the end of October and the beginning of November the bull Caribou go into the woods either singly or in small herds. Shortly the old bulls cast their horns. At the end of November most of the Caribou, especially

the females and young, move southwards by many circles back into the barren lands and again in December large bands are moving southwards into the woods. The females and young in large numbers remain outside the woods all winter but most of the bulls go into the woods, although during very stormy weather they cannot detect strange sounds and, being frightened, they leave the woods for large lakes or open places. By the month of May there are no Caribou in the woods and the bulls travel northwards in bands of 2 to 20 or larger, scattering out for the summer when they may be seen wandering about aimlessly in ones and twos. Winter or summer they are constantly on the move. The wounded and sick endeavour to pass the summer on islands or close to water in order to escape pursuit from the Wolves [*Canis lycaon tundrarum*]. I do not think the Caribou move north and south in one large continuous mass, but that, there are many distinct immense herds, which in their north and south migrations, according to seasons, scatter out in the different local ities.

In 1909 Caribou came in large numbers very close to the Mackenzie River between Norman and Wrigley and at the same time were exceptionally numerous at Fort Rae and were close to Fort Smith.

In the Thelon Area in 1924 and 1925:

September

1-12 No Caribou seen between Great Slave Lake and Artillery Lake.
13 Two bull Caribou seen on east side of Artillery Lake opposite Timber Bay.
14 About four females seen on east shore above Beaver Lodge.
16-28 A few bulls and also females with young were seen in separate bands between Trout Creek and Casba River.
30 Plenty of Caribou, both bulls and cows, north of Artillery Lake.

October

1- 4 A few Caribou seen close to Casba River
5 Two bands of Caribou, each band consisting of one bull, three or four females and young.
17 Saw about fifty Caribou going southwest, cows and calves.
18-29 Bull Caribou travelling slowly southwest.

November

3 Caribou extremely numerous along shore of Artillery Lake, southwards to edge of timber; the ice not yet strong, Caribou apparently waiting to cross and go southeast.
4- 7 Caribou in large numbers turned and went north.
10-20 Caribou in very large numbers from the edge of the timber to north of Artillery Lake, thousands in the aggregate.
21-26 Many Caribou travelling southwards; at times several hundreds were to be seen on the ice moving towards Crystal Island.
26-30 Caribou moving northwards either turned by the Indians who were hunting them or else by other Caribou coming from the south.

DECEMBER

1-30 Caribou seen feeding and moving in northerly direction, chiefly females and young, although occasionally a band of bulls.

JANUARY, 1925

1-10 The movement noted in December continued.
10-31 Caribou were plentiful on the northeast side of Artillery Lake, for the most part females and young. The bulls have gone to the woods and at this time they were in large numbers in the wooded country southeast of of Artillery Lake.

FEBRUARY

1-26 Along Hoarfrost River, Caribou exceedingly plentiful. Along Artillery Lake, Caribou very scarce.
8-28 Female Caribou and young always to be seen moving generally eastward.

MARCH

1-17 Female Caribou passing eastwards in small numbers.
17 Female Caribou very plentiful between Artillery Lake and Casba River.
18-20 Female Caribou always to be seen on Casba River.
22 Female Caribou very plentiful. Wolves plentiful.
25-28 Female Caribou very plentiful, small bands going east.
29 A few bulls were seen.
31 Females and young continually passing and going east.

APRIL

10-22 Female and young moving northwards in large numbers.

22-30 Occasionally saw bulls travelling north.

MAY

6 Saw twenty bulls going north.

8-24 Between Casba River and Campbell Lake occasionally saw few bulls going north.

JUNE

4- 5 Close to Campbell Lake saw plenty of Caribou going north.

6 Saw forty-six bull Caribou bunched up ready to cross the ice and go north; also saw two other bands.

7 Saw few bull Caribou close to Smart Lake going north.

8 On Smart Lake saw a few bull Caribou going north.

10 Saw a few bull Caribou along south shore.

12 Saw plenty of bull Caribou around south shore of Sifton Lake.

16-19 Saw a few bull Caribou going north.

21 Below Sifton Lake saw a few bull Caribou.

28 On a small lake below Sifton Lake saw one bull Caribou.

JULY

2- 3 South of Lake Dubawnt saw three bull Caribou.

3 Below the fourth portage on Hanbury River saw one bull on south shore.

23 About five miles below the forks of the Thelon and Hanbury Rivers we met the Caribou migrating southwest, chiefly females and young.

24 Large number of Caribou passed on west shore while at the same time bands of Caribou were passed on the east shore, many of which were bulls. During the two days there were between 5,000 and 10,000 at the least.

25 26 We passed Caribou singly and in small numbers following up the river driven frantic by the flies.

27 Large numbers of Caribou passed during the night and early in the morning following the east shore of the river or going south. Cows and young and also bulls.

AUGUST

1 Just below Lookout Point saw one small bull Caribou.

5 Just before reaching Beverly Lake saw one Caribou.

7 East of Beverly Lake on the islands saw several Caribou. They were all young females and also young cows. All were poor and many were crippled.

19 At the narrows of Aberdeen Lake at the south side saw one bull Caribou and two very young Caribou. One young Caribou was very reluctant to leave the camp.

21 Below Aberdeen Lake and south shore of river one crippled Caribou followed by two small Caribou was seen close to the river.

23 Below Schultz Lake at the head of the river saw one bull Caribou. It was about three years old and in very good condition.

25-29 Saw plenty of Caribou along the banks the river. They were chiefly females and young.

SEPTEMBER

7 Caribou were fairly numerous on the south side of Baker Lake just at its outlet. About two weeks previously I was informed that large numbers of Caribou had been seen crossing the River close to Baker Lake.

MUSK-OX — *Ovibos moschatus* (Zimmermann)

1908 I saw seven Musk-oxen north of Fort Confidence, Great Bear Lake.

1910 I got two which Indians had killed on Caribou Point, which lies between Dease River and McTavish Bay. About this time Musk-oxen were fairly plentiful to the north of Great Bear Lake.

1911 I observed fifty-three Musk-oxen east of the Coppermine River.

1922 When at Artillery Lake there was a small herd close to Walmsley Lake.

1925 IN THELON AREA

JULY

19 Saw eleven Musk-oxen close to Helen Falls south of Hanbury River. They were a long way off and it was difficult to determine how many cows there were among them.

20 Saw herd of eleven which passed at some distance south of the river and went in a northerly direction.

24 Camped above Grassy Island—saw three bull Musk-oxen on Grassy Island.

25 Saw two bull Musk-oxen on north shore above Grassy Island and three on island.

26 Saw sixteen Musk-oxen above Grassy Island. First of all saw fourteen Musk-oxen with which was one large bull and the rest were cows, yearlings and four calves. Shortly after, two more came along, one was a young bull and the other a yearling cow.

26 Also saw one bull on Grassy Island and another a short distance below on the north shore.

28 Saw two large bull Musk-oxen on north shore about forty miles from the forks of the river.

30 Opposite Lookout Point at the mouth of and up the valley of Finnie Creek (this hitherto unnamed creek I have named in honour of Mr. O. S. Finnie) I saw signs of Musk-oxen.

29 About ninety miles from forks of Hanbury and Thelon Rivers saw one bull Musk-ox.

AUGUST

3 About six miles above the place that Tyrrell calls the "crossing place of deer" I saw one bull Musk-ox slowly walking along the shore. The "crossing place of deer" is at the edge of the timber, especially Grassy Island. The grazing was plentiful and the willows thick and high. It appeared to be an ideal place for the Musk-oxen which hitherto seemed to be undisturbed for they showed no fear, only curiosity. This area would make an ideal sanctuary for wild animals and birds. Not only white men but also natives should be prevented from entering this district. Musk-oxen feed entirely on the grasses, dwarf birches and saxifraga. They are not moss eaters. Back from the river, although grazing is plentiful, it is exceedingly short and could never be called a grassy prairie.

MOOSE — *Alces americana* (Clinton).

No signs of Moose on the Thelon River.

TUNDRA WOLF—*Canis lycaon tundrarum* Miller.

The Tundra Wolves vary greatly in colour from pure white to dark and the latter rarely belong to the timber. Large and not ferocious, they are among the finest animals we have, but unfortunately they have a bad name and there is every desire to slaughter them all. Now it is a question if all the Wolves were killed off, would the Caribou increase or would they die off through weakness? The Wolves must undoubtedly kill off the weak and sick Caribou and consequently only the hardy ones are left to reproduce. In summer Wolves can be met with almost everywhere in the barrens. After the mating season they go off in pairs. They have their young in any suitable spot, generally facing south on the side of a ridge in a sandy place in a den about one yard from the entrance and sometimes only under a small spruce tree. In winter when Caribou are numerous Wolves are also fairly plentiful.

I have never found the Tundra Wolves travelling in larger packs than seven. Once, however, after a large slaughter of Caribou I counted 41 wolves but they had only collected in passing and were eating up the remains. In that country, expecially in winter, there is nothing that a Wolf will not eat but they are not dangerous, for on several occasions I have had Wolves come within a few inches during the night.

In the winter of 1924 — 1925 Caribou were very plentiful and Wolves were scarce. Probably most of the latter had followed the larger bands of Caribou into the woods. Their mating season begins at the end of April and their young are born about the first of June. During the months of March, April and May, there were many Wolves seen going north and although only one den was found we saw many Wolves along both the Hanbury and Thelon Rivers. Most of them were white in colour but I saw one dark specimen at the edge of the woods on the Thelon River. No doubt Wolves procure ample food in summer by following river banks.

WOLVERINE—*Gulo luscus* (Linnaeus).

Only three were seen around Casba River.

RED FOX—*Vulpes fulva* (Desmarest)

There were a few Red Foxes along Artillery Lake in the woods to the west and one, which was caught on the east shore, was given to me.

WHITE FOX—*Alopex lagopus innuitus* (Merriam).

White Foxes were very plentiful all fall and winter around Casba River. It was possible to see them almost daily during the longer days. The last White Fox seen was on Smart Lake. On the Thelon River we only saw one track of a Fox.

MACKENZIE OR NORTHERN VARYING HARE—*Lepus americanus macfarlani* Merriam.

These Hares are very plentiful at the edge of the timber and also to the north of Artillery Lake. On Hanbury Lake we saw one young Arctic Hare, [*Lepus arcticus andersoni* Nelson, 1934].

GROUND SQUIRREL—*Citellus parryii parryii* (Richardson).

There were a few around Artillery Lake but very plentiful on the Hanbury and Thelon Rivers. Two specimens were procured on the Hanbury River.

BACK'S LEMMING—*Lemmus trimucronatus* (Richardson).

They were very plentiful north of Artillery Lake and on the Thelon River they were very scarce.

GRIZZLY BEAR—*Ursus richardsoni* Swainson.

I saw in two places signs of where one of these bears had eaten a Musk-ox. None, however, was seen during my stay on Great Bear Lake. I procured several of these bears. They were not at all uncommon to the east and south of McTavish Bay.

FISH—1924-1925

TROUT—[*Salmo* spp.]

October—Both the Lake and Salmon Trout were caught in nets at the northwest end of Artillery Lake.

July 9—On Hanbury River below the 4th portage caught three Trout weighing respectively 6, 1¾, and 8 pounds.

July 11—Again in same place caught four Trout, of which one weighed 12 pounds, in a net and two Trout on hooks.

July 13—Below McDonald Falls we caught three small Trout.

July 14-17—Caught five Trout below Dickson's Canyon.

July 18—Below the small falls past Helen Falls (Hanbury River) we caught a few large Trout, two of which weighed twelve pounds each.

July 21—Caught two small Trout five miles below the forks of the Thelon and Hanbury River.

August 18—Caught one Trout just above Aberdeen Lake.

August 22—Just above Schultz Lake caught two Trout, one of which was a Sea Trout. Below Schultz Lake and in Baker Lake plenty of Trout were seen.

WHITEFISH—[*Coregonus* spp.]

October—A few Whitefish caught at north west end of Artillery Lake.

July 9—On Hanbury River below the 4th portage caught one Whitefish, weight 2 pounds.

July 11—In same place caught two more Whitefish.

August 18—In river below Aberdeen Lake caught twenty Whitefish.

August 22—Above Schultz Lake two Whitefish.

TULLIBEE—[*Argyrosomus tullibee* (Richardson.)]

October—Plenty of Tullibee caught at north west end of Artillery Lake.

SUCKERS—[Northern Sucker *Catastomus catastomus* (Forster), or Gray Sucker *Moxostoma lesueuri* (Richardson)].

October—One Sucker caught at north-west end of Artillery Lake.

July 14-17—Several large Suckers caught in Hanbury River below Dickson's Canyon.

BACK'S GRAYLING—[*Thymallus signifer* (Richardson)].

July 14—Caught a few below Dickson's Canyon.

July 18—Below Helen's Falls these Grayling are very plentiful.

BIRDS—1924-25

1925 COMMON LOON—*Gavia immer* (Brünnich)

Very scarce, only seen twice on lower reaches of Hanbury River and also below Grassy Island.

June & July 1925 YELLOW-BILLED LOON—*Gavia adamsi* (Gray)

These Loons very common from Campbell Lake to Schultz Lake. Several nests were found.

PACIFIC LOON—*Gavia arctica pacifica* (Lawrence)

Very plentiful both on the Hanbury and Thelon Rivers.

RED-THROATED LOON—*Gavia stellata* (Pontoppidan)

Fairly common on both Hanbury and Thelon Rivers. Nest and eggs procured east of Sifton Lake.

1924 RED-BREASTED MERGANSER—*Mergus serrator* (Linnæus)

These were seen both on the Hanbury and Thelon Rivers during the months of June and July.

MALLARD—*Anas platyrhynchos* Linnaeus.

I thought I saw some Mallards about ninety miles from the forks of the Hanbury and Thelon Rivers.

PINTAIL DUCK—*Dafila acuta tzitzihoa* (Vieillot)

One pair seen on Sifton Lake and another on the Hanbury River.

LONG-TAIL OR OLD-SQUAW DUCK — *Clangula hyemalis* (Linnæus)

This is a very common Duck in the north country but few were seen between Artillery Lake and Baker Lake, some were seen just before we reached Campbell Lake. Along the Hanbury and Thelon Rivers and the small lakes adjoining these Ducks were occasionally seen during the months of June and July.

SNOW GOOSE—*Chen hyperboreus* (Pallas)

May—A few flocks seen going north between Artillery Lake and Campbell Lake.

July 25, 1924—WHITE-FRONTED GOOSE—*Anser albifrons gambeli* (Hartlaub).

From Smart Lake to Hanbury Lake they were often seen in pairs and above Sandy Lake, young were seen.

COMMON CANADA GOOSE — *Branta canadensis canadensis* (Linnæus)

On the lower reaches of the Thelon River they are not uncommon.

July 28, 1924—*Hutchins's* GOOSE—*Branta canadensis hutchinsi* (Richardson)

These geese are very plentiful along the Thelon River from Grassy Island to Baker Lake. They breed there in large numbers.

May 30, 1924—WHISTLING SWAN—*Cygnus columbianus* (Ord).

Between Artillery Lake and Campbell Lake saw a few Swans going north.

July 28, 1924—About forty miles below the forks of the Hanbury and Thelon Rivers saw two Swans with young.

May 24, 1925—LITTLE BROWN CRANE—*Grus canadensis canadensis* (Linnæus)

Saw one Crane, either a Sandhill or else Little Brown Crane between Casba and Campbell Lakes.

August 4—Saw close west of Beverly five Sandhill Cranes, *Grus mexicana.*

1924 WILLOW PTARMIGAN—*Lagopus lagopus albus* (Gmelin).

About the first snowstorms these birds begin to go south. Travelling along the east shore of Artillery Lake from September 16 to the end of the month we almost daily saw these Ptarmigan going south. A few flocks stay till late in the winter wherever there are large willows. At the beginning of May they appeared again at the head of Artillery Lake and were daily to be observed passing in large numbers. Along the banks of the Hanbury and Thelon Rivers they nest but never in large numbers.

ROCK PTARMIGAN—*Lagopus rupestris rupestris* (Gmelin)

These are smaller birds than the Willow Ptarmigan, in summer they are generally to be seen on the higher ground. They are not quite so numerous as the others. They migrate about the same time but always during the winter can be seen in the barren lands. They feed chiefly on the dwarf birches on the ridges close to the banks of Hanbury and Thelon Rivers. In the summer we occasionally saw a few pairs.

Both Willow and Rock Ptarmigan are white in winter but few obtain their beautiful summer plumage.

1925—MARSH HAWK—*Circus hudsonius* (Linnæus)

Seen in October northeast of Artillery Lake.

1921-1922—GOLDEN EAGLE —*Aquilla chrysaetos canadensis* (Linnæus)

I found a pair nesting north of Fort Reliance on the Lockhart River.

NORTHERN BALD EAGLE—*Haliæetus leucocephalus alascanus* Townsend.

On the islands in Hornby Channel in Great Slave Lake, 1921-1922, I saw two nests. No Eagles were seen on Hanbury or Thelon Rivers.

1925—GYRFALCON—*Falco* spp.

Both the White *Falco islandus* and also the Gray Gyrfalcon *Falco rusticolus* were seen in the late fall and early spring north of Artillery Lake. Some of these birds stay all winter.

DUCK HAWK—*Falco peregrinus anatum* Bonaparte.

These hawks were plentiful, from below Sifton Lake, they were found nesting in the cliffs and high banks along the Hanbury and Thelon Rivers.

1921-1922 SNOWY OWL—*Nyctea nyctea* (Linnæus)

To the north of Artillery Lake these were very plentiful and remained till December.

HOYT'S HORNED LARK—*Octocoris alpestris hoyti* Bishop

Also numerous in the same districts as the Longspur, *Calcarius lapponicus.*

CANADA JAY — *Perisoreus canadensis canadensis* (Linnæus).

They are numerous up to the last woods on the Artillery Lake. Few were seen on the Thelon River.

NORTHERN RAVEN — *Corvus corax principalis* Ridgway.

In winter the Ravens were scarce. In spring a few were seen, most of them going north. Below Dickson's Canyon there was one pair nesting. During the trip they were occasionally seen.

REDPOLL—*Acanthis linaria* (Linnæus)

Many of these birds were seen nesting in the vicinity of Hanbury River.

SNOWFLAKE — *Plectrophenax nivalis* (Linnæus)

In the early spring and in the summer these are to be seen everywhere throughout the barrens.

LAPLAND LONGSPUR—*Calcarius lapponicus lapponicus* (Linnæus)

In the summer these were found in large numbers nesting in all the open country between Casba Lake and Baker Lake.

WESTERN SAVANNAH SPARROW — *Passerculus sandwichensis alaudinus* Bonaparte

Not uncommon throughout the barrens.

GAMBEL'S WHITE-CROWNED SPARROW—*Zonotrichia leucophrys gambeli.* (Nuttall)

These were plentiful during the first week in June at the north of Campbell Lake on the islands.

1921-1922—AMERICAN ROBIN—*Turdus migratorius migratorius* Linnæus.

A few of these noisy birds were seen in the woods along the Thelon River.

In these woods it was impossible to note what birds there were as, owing to the lateness of the season, we were compelled to travel rapidly.

ANIMAL PARASITES OF NORTH-EAST CANADA

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THE Institute of Parasitology in 1933 commenced a survey of the internal parasites of domestic and wild animals in Canada with the object of finding what species of parasites are present, which are important, what damage they are doing, and suggesting steps which may be taken to prevent this damage. This is the first comprehensive, planned survey of internal parasites, which has been undertaken in any country. The following notes relate to that part of the survey which was carried out in north-eastern Canada last summer. Previous to this practically nothing was known of the parasitological conditions in the north, since, except for a few isolated observations by scientists who had gone to collect other material and were therefore, more or less uninterested in internal parasites —no survey had been attempted.

Owing to the climatic conditions difficulties were encountered and several problems had to be solved before going north. The first two of these were to obtain a preserving fluid, such as formalin, which would not precipitate with cold, and containers which would withstand the pressure of liquid freezing in them. With the help of the National Research Council and Standard Chemicals of Montreal, who made up a special mixture for us, the first problem was solved. The Eastern Steel Company of Montreal built a special corrugated and shaped container, in the testing of which we received generous help from the Managers of the Ice Manufacturing Company and Purity Ice Cream Company. One of the General Steel Wares stock garbage cans also passed the freezing test.

A passage on the Hudson's Bay icebreaker *Nascopie* was arranged through the co-operation of the Department of the Interior. Fifty-four gallons of formalin, packed in half-gallon tins, together with 41 ten and twenty gallon garbage cans were taken on board, together with a supply of labels, string, cheese cloth and typed instructions. Supplies of preservative and containers were left at Police and Fur stations in Northern Quebec and the north-eastern Arctic islands.

The collectors at the different posts were asked to dilute the formalin with eight times its volume of water in the garbage cans, then to deposit either the entire carcass of small animals (with a hole made in the abdominal wall) or the entrails, of large animals, into the can; when they were ready to be shipped back to the Institute, the formalin was to be drained off, the contents covered with moss or sacking to prevent excessive drying.

Many of the cans have not yet been received by the Institute of course, but the *Nascopie* and C.G.S. *N. B. McLean* brought back some material in the fall. This, together with my own observations and specimens collected during the trip, form the basis of the notes which follow.

Many of the men travelling on the *Nascopie*, who knew the North, considered that the incidence of appendicitis during the last few years had been high, and since many surgeons consider that a small worm, the so-called seat-worm or *Oxyuris vermicularis*, is one of the many causes of appendicitis, steps were taken to find out whether this worm was common among the Eskimos who may easily contaminate the food when cooking for white men. This worm has a direct life history. The female, which lives in the latter part of the large intestine, lays only one batch of eggs and dies; to do this she emerges from the host, almost always at night, and deposits her eggs in batches on the skin. With the eggs is some irritant substance which causes itching; scratching follows and the eggs get on to the host's finger nails; from these, food can be easily contaminated. With the help of the R.C.M.P., and the ship's doctor, we were able to examine a number of nail scrapings taken from Eskimos who were being medically examined for various causes. The incidence of this worm seems to be high. Although it is usually found chiefly in young children and very old people, and although the nail scrapings were taken from Eskimos of all ages, we saw eggs in scrapings from Pangnirtung and Lake Harbour in Baffin Island and from most of the posts on the south side of Hudson Straits and the east side of Hudson's Bay. While the finding of the characteristic egg in the nail debris is definite evidence of infection, its absence there does not necessarily mean that the host is free from the worm. It would be desirable therefore for white men to make sure that the Eskimos who cook for them keep their nails short and clean. It may also be that some of the deaths, which are generally put down to "constipation," may really be a form of appendicitis caused by this worm.

Rather more in the realm of speculation is the part the *Trichina* worm may play in those deaths of whole families which are periodically reported among the Eskimos. These wholesale deaths are always ascribed to "ptomaine" poisoning: without, however, any real evidence. The *Trichina* worm has a life history which is somewhat unusual. The adults — which are only a few millimetres long—live in the small intestine and produce living larvæ. But instead of passing out of the host in the fæces, these develop within the host's body, and migrate to all parts of the muscle tissue; there they encyst and may live for years, no further development taking place until the flesh which contains the encysted larvæ is eaten by another mammal, when they become mature. The adult forms live only about two months, but during that time they produce a very large number of larvæ—so that even in a mild infection, in a piece of flesh the size of a ten cent piece, there will be dozens of larvæ. Naturally the migration and encystment of all these larvæ causes great discomfort and even death. The disease in man is often diagnosed as ptomaine poisoning, rheumatism or typhoid. For a considerable time it has been a by no means uncommon parasite on the American continent and the present evidence suggests that it is increasing. It is, however, not a normal human parasite but one essentially of flesh-eating mammals, and a large variety of wild carnivores are infected. The parasite is holarctic in its distribution and we have found it already in Arctic Foxes and Polar Bears. Whether or not seals and walrus are natural carriers is a matter still to be decided. There is no theoretical reason why they should not be.

In the north, the dog is the all important animal, but this preliminary survey has made it obvious that their power to work must be considerably decreased and death not infrequently caused by internal parasites.

We have been able to examine some dog fæces from East Baffin Island and Moosonee, Ontario; two dogs from north east Baffin Island and two and a very young puppy from the north coast of Quebec. Among this limited material we have found Hookworms, a fish-carried tapeworm and fish-carried flukes among other worms.

The Dog Hookworm (*Dochmoides* or *Uncinaria stenocephala*) belongs to that family of worms which has caused the most loss to man: Hookworm disease in man is regarded as one of the four greatest diseases in the world, and the Rockefeller Foundation alone has spent literally scores of millions of dollars on hookworm research and control in man in the tropics and sub-tropics. The life history of the Hookworms shows interesting biological adaptions to the host's habits. Each female worm produces many thousands of eggs per day. These pass out in the fæces. where, under suitable conditions of temperature. air and moisture, development takes place. Under optimum conditions the eggs hatch in two days and there emerge small larvæ which feed on bacteria and fæcal debris; after another two or three days, they moult and again start to feed and grow; in a few more days the larvæ again moult. Until this stage, during which they do *not* feed outside the host, is reached they are unable to infect the host animal. They are now much more resistant to unfavourable outside influences than in the earlier stages and they can withstand considerable freezing. They are attracted and activated by heat—and if they get on to the skin of a mammal they become very active and, attracted by the warmth, bore into it until they reach a blood or lymph vessel; they are then carried along passively through the heart to the lungs where they break through the small blood vessels, ascend into the throat, are swallowed and thus reach the intestine. If they are originally swallowed with food, however, they do not migrate through the body of the host, but reach maturity directly in the small intestine. There they feed on the tissue and blood and when present in any numbers cause anæmia and even death. Luckily, there are two or three efficient anthelmintics against hookworm. One is carbon tetrachloride, but this, in the north, raises another local problem, since, although usually a safe medicine, in the presence of fat it is poisonous, and most of the dogs are fed on seal meat, which, of course, contains a lot of blubber. Tetrachlorethylene is another drug which might prove useful as it is much less toxic: but a fat diet makes it relatively inert, and it is comparatively expensive. Oil of chenopodium is probably the most practical as, mixed with castor oil, it is comparatively safe for both adult dogs and puppies.

This life history shows how successful control of this worm may be undertaken, since it is almost certain that no development of the free living stages could take place after October or before June—during which time the dogs could be put on a careful fish ration for a few days and then dosed. If this were done two or three times for all the dogs, being very careful that none was left undosed, this parasite could be practically wiped out in the north, except for infections which may occur in foxes. We have not yet been able to see any fox carcases from the far north and although they probably harbour the parasite, it is possible that their lack of contact with dogs in the summer would prevent cross-infections. The dog we saw from Burwell was suffering from very typical hookworm disease with pronounced anæmia. It is of interest to note that a very closely related species of hookworm is found in seals and the relationship between it and the dog-fox hookworm is not only a question of great scientific interest but one of considerable practical importance from the point of view of both hosts. Other parasites of land carnivores have been reported from seals and their relatives in the past but they are still very incompletely understood and form a problem still to be solved.

From Stupart's Bay we received a dead dog which belonged to an Eskimo, and apparently had died from an infection of ascarids; eggs of this species have also been found in fæces from Baffin Island. The life history of this worm is somewhat like that of hookworms, except that the eggs do *not* hatch from their highly protective shell until they are swallowed by the host animal; the larvæ then penetrate the stomach wall and, entering the blood stream, follow the same migratory course as Hookworms. In the case we saw, the dog had evidently received a heavy infection and during the course of the larvæ's migration through the lungs, they had set up a fatal pneumonia. Owing to the habit of migrating through the host's blood stream, prenatal infection of puppies can, and frequently does, take place. Oil of chenopodium with castor oil, as mentioned above, is a very efficient medicine against ascarids. These worms should be removed in early fall, and it is probable that in north-east Canada, the cold will be sufficient to prevent many eggs surviving the winter out of doors, and the snow should prevent dogs picking up an infection during the winter. Using these med-

icines carefully, we believe a considerable amount of loss in energy and life among that all important animal, the dog, can be prevented, but it must be remembered that they are poisonous under certain conditions.

The tapeworm eggs we have found belong either to the Broad Tapeworm or to a species closely related to it. This worm, which is becoming increasingly common in man in southern and mid-Canada, can produce millions of eggs every day and live for several years. The eggs are passed from the host in the fæces and only if they fall into water, does further development take place. The next necessity is that they be eaten by a species of *Diaptomous* or *Cyclops*. A metamorphosis takes place in these animals, which in turn have to be eaten by fish. In the fish the first intermediate host is digested and the larvæ become free in the intestine through which they burrow, and encyst in its flesh. If this happens in a small fish which is eaten by another, the larvæ can again bore through this second intestine and encyst. The final stage is reached when this fish is eaten by man, or an omnivorous or carnivorous mammal; the encysted larva then becomes attached by its head to the host's intestines, grows to a large size, and becomes mature. This tapeworm is probably a fairly recent immigrant into Canada, having come over here with Europeans from the Baltic regions, where it is very common. But it may have been imported by the Norsemen nearly a thousand years ago, or by Eskimos even earlier. Owing to the impossibility of preventing wild animals from eating fish, it seems doubtful it will ever be eradicated, but much can be done to prevent man and domestic animals from becoming infected. Thorough cooking of fish of course, kills all worm infections, and two or three alternate freezings and thawings probably kill this tapeworm in its larval form.

The other important dog parasite we have identified is a liver fluke; so far we have only found it in dog fæces which we obtained rather south, about latitude 48°. Its close relations are common in the Baltic regions, Japan, China and Siberia, and there it is often a parasite of man, as well as of domestic cats and dogs and their wild relatives. In man, it is often associated with cancer of the liver; even when cancer is absent, it often causes a fatal disease. To complete its life history, it needs two intermediate hosts: a snail and a fish. The eggs are again passed out in the fæces, and if they fall into water, no development takes place until they are swallowed by a particular species of snail. In the snail the egg hatches and bores into its body; there it asexually multiplies, giving rise to a motile larval form which has to leave the snail and find a fish. Should it do so, it encysts on it, usually on a scale, and not until the fish is eaten by a suitable mamal, is the life cycle complete. Against this parasite, when harboured by man or dogs, there is as yet no very efficient treatment, but in any district where this parasite may be, cooking is a safe preventive, while skinning the fish reduces the risk very considerably.

So far the number of wild animals we have been able to examine has been limited, and insufficient of any one species to give many definite facts concerning their fauna and its distribution.

It is important to remember that many parasites of man and domestic animals may be carried by wild animals. Morever there is evidence that in many parts of the world parasites of wild animals are gradually being acquired by domestic ones. This has been well illustrated in Africa, and even in Canada we have the familiar example of the large liver fluke of our native ruminants being passed to cattle and sheep.

It is a general rule that parasites are exceptionally severe in unusual or "new" hosts and this makes it the more important to know what our wild fauna contains.

Our general experience has shown that at least three quarters of all wild animals harbour parasites and it is seldom realized how large a number of parasites they may contain. For instance, we examined two adult snowshoe rabbits from the Moose River area this summer, each with a fairly heavy, but typical, infection of parasites. We attempted to estimate the number in one of them. In the small intestine there were three species of parasites, none numerous; in the large intestine there were two or three more different species which were more numerous—some 400 worms; in the stomach still another species predominates—a blood-sucking worm about an inch long, there were between 1,500 and 1,600 of these, making a total of about 2,000 worms in a single rabbit. It is not difficult, therefore, to imagine the drain on that rabbit's health.

At present no satisfactory method has been devised of treating wild animals and birds. But it does not seem impossible for man to devise some method which may reduce the incidence among wild animals. The use of medicated licks for example, holds out much promise, even although not yet practicable.

So far as other wild forms are concerned, we have only been able to examine a few birds, chiefly ducks, geese and seagulls; the majority have been parasitized. In addition we have been able to examine about 20 lemmings and they also harbour parasitic worms especially in the large intestine. These are still under investigation.

Without the cooperation of the Royal Canadian Mounted Police, the Hudson's Bay Company, and Revillon Frères, who wholeheartedly helped, this survey would not have been possible. As an example, the case of the Hudson's Bay Factor in Chimo may be quoted. Mr. Watson of the Hudson's Bay Company asked him to collect for us, and I asked him how many cans he would fill during the year—I had allowed two for each post in my estimate of the number required—and he offered to fill twelve; he sent one back full when the *Nascopie* called at Burwell a few weeks later. The Hudson's Bay Post at Stupart's Bay also had an opportunity of sending back material by the C. G.S. *N. B. McLean*, and a really carefully collected and labelled selection was received.

As stated earlier in this article, the survey of North Eastern Canada is only part of a planned Dominion-wide survey which has a three-fold object:—

(1) To find what parasites occur in domestic animals, the localities in which they do or can occur, and which are of actual or potential importance, not only to animals but to man.

(2) To find what parasites occur in fur animals, game animals and the animals on which they feed. To ascertain which of these are actually or potentially important to domestic animals and to the economically important wild animals.

(3) To find the importance of parasites in the causation of fur cycles.

This survey will take considerable time to complete but it will place our knowledge of parasites in Canada on a sound and scientific basis. Parasitology is rapidly being recognized as being of the greatest importance in connection with all forms of animal life and it is important that the Dominion with its important live stock and fur industries, its national parks and animal preserves and its irreplaceable wild fauna should be in a position to utilize the growing volume of information which is accumulating on the insidious effects of internal parasites and the methods of preventing their enormous losses. It is impossible for the Institute of Parasitology to complete this survey — even imperfectly — without the co-operation of all interested in animal life in Canada. We have already received most enthusiastic assistance from many quarters but we hope that all students of natural history will help. We shall accordingly be pleased to send full instructions to any who will assist in securing material.

NOTES ON BIRDS OF THE LABRADOR PENINSULA IN 1931, 1932 and 1933

By HARRISON F. LEWIS

(Concluded from Page 102)

Stercorarius parasiticus PARASITIC JAEGER.— A male in the light phase, judged from its plumage to be a little more than a year old, was shot by a fisherman near Blanc Sablon on August 12, 1933. It was seen by me less than an hour after it was taken and, in accordance with the Migratory Birds Convention Act, was forfeited to His Majesty. The specimen has been deposited in the National Museum of Canada.

Larus delawarensis. RING-BILLED GULL. — I have previously published[7] a statement of the colonies of this species on the north shore of the Gulf of St. Lawrence, with the approximate population of each, as known to me in 1925. Many changes in the distribution of the breeding population of these Gulls in this region have taken place since then and in 1933 it was approximately as follows:

[7] *Auk*, 44: 61.

Colony	Adult Population
Kegashka River and vicinity	1500
Pointe au Maurier	650
St. Augustin	612
Total	2762

In 1925 the total population of all known colonies in the region was 1190. Probably some small nesting groups escaped observation in both 1925 and 1933.

The colony near the mouth of Kegashka River, which is usually concentrated on one island for nesting purposes, was scattered over several islands, in a territory several miles in diameter, during all except the early part of the nesting season of 1933, because the colony was robbed of most of its eggs early in June, and the birds separated into groups on various islands for the second laying. Only about 700 adults remained to lay again on the original site, but 1500 is considered a fair estimate of the number of adult Ring-bills in the colony before it was disturbed.

The colony at Pointe au Maurier was larger in 1933 than in any previous year in my experience.

The colony at St. Augustin is situated in the government bird sanctuary at that place. Ring-billed Gulls were first known to nest there in 1930, and the population of this colony from that year to 1933 has been approximately as follows:

1930	300	
1931	418	(209 nests)
1932	500	
1933	612	(306 nests)

The Gulls in this colony have not always used the same nesting site in successive years, but I can give no reason for their changing from one site to another. In some cases the change made has been from one island to another, although the distance from one site to the next one selected was less than a mile in each instance. In 1933 the nests were grouped on two islands, not far apart, on each of which, in accordance with the usual custom of this species, they were crowded into a restricted area, while a large part of the space available on the island was not occupied at all.

The small colonies that existed in Aylmer Sound and Mecattina Sanctuary in 1925 are found there no longer.

Rissa tridactyla tridactyla. ATLANTIC KITTIWAKE.—As I have recorded previously,[8] Kittiwakes nested in 1924, for the first time, as far as known, on ledges on the face of a low cliff on Bald or Gun Island, in Betchouane Bird Sanctuary, about 17 miles east of Havre St. Pierre. In that year 23 nests were found, and on July 28, 15 large young were seen in the nests and about 35 adult Kittiwakes were in the vicinity. The strange history of this nesting group of Kittiwakes in the nine years that followed is briefly recorded here.

1925. June 4 and 27, about 70 adults, many nests, no eggs or young. [9]

1926. July 8, two adults, no nests seen.

1927 June 6, three adults, six nests, no eggs or young.

1928 June 3, one adult, three nests, no eggs or young.

1929 June 15, four adults, three nests, no eggs or young.

1930. June 8, one adult, no record of nests or contents.

1931 June 24, one adult, two nests, no eggs or young.

1932 June 20, three adults, two nests, no eggs or young.

1933 June 13, four adults, three nests, one with 1 egg and 1 with 2 eggs. July 27, three adults, one nest with 1 egg (apparently deserted), one nest with 3 large downy young, 1 nest with 1 large young, partly feathered.

Whatever may be the explanation of the history of this little colony, as recorded above, I am confident that the robbing of nests by man has no part in it, for Kittiwake eggs are small and not sought after, and the few that might be laid on this overhanging cliff would be so difficult to reach that the special effort necessary would far outweigh, in an egg-gatherer's mind, any temptation they might have for him Besides, there is no lack of larger and more accessible eggs in the vicinity, which would divert attention from any Kittiwake eggs.

If there were a large colony of Kittiwakes in the neighbourhood, this small colony might be an overflow, in which abnormal conditions might be caused by the shifting of birds from one colony to the other, but the nearest colonies to this one, as far as I know, are those at Carosel Island, Seven Islands (140 miles west) and at Gull Bay, Anticosti (92 miles southeast).

[8] *Auk*, 42: 279.

[9] Auk, 44: 60.

Hydroprogne caspia imperator. CASPIAN TERN.—The small colony of this species on Fog Island appears to be increasing slowly in size. On July 13, 1932, I counted in it 48 occupied nests and one pair of large young running about, so that it would seem that there must have been at least 49 nesting pairs in the colony at that time.

On June 21, 1933, I counted in this colony 35 nests with eggs and 30 nest-hollows without contents. The deposition of eggs in the colony had not terminated at that time and no doubt many, though perhaps not all, of the nest-hollows that I found empty held eggs later in the season.

Uria aalge aalge. ATLANTIC MURRE. — The population of the colony of this species on a rock in Fog Island Bird Sanctuary, which was recorded as 2586 breeding birds in 1930[10], was estimated at 2800 breeding birds on July 19, 1931, when an exact count of eggs was impossible, because most of the young had hatched and were running about. On July 6, 1932, I counted 1866 eggs and 3 young birds of this species in this colony, indicating a population of 3738 breeding birds. Shortly before the middle of June, 1933, the colony was robbed of all eggs laid up to that date, but on June 21 of that year I counted in it 1786 eggs, representing 3572 breeding birds. It is highly probable that many adults in the colony were not represented by eggs on the last-mentioned date, because of the short time that had elapsed since the robbery, and that the actual population of the colony was therefore greater than the number stated.

Cryptoglaux funerea richardsoni. RICHARDSON'S OWL.—At Wolf Bay, near Cape Whittle, I was shown, on July 17, 1931, an adult female Richardson's Owl in the flesh. It had been shot there on that date by R. A. Johnson, of Onconta, New York, who has kindly given his permission for the publication of this record. The bird was found on an exposed, rocky point, a mile or more from the nearest trees.

Megaceryle alcyon alcyon. EASTERN BELTED KINGFISHER.—On August 10, 1932, I saw, at the harbour in St. Mary Islands Bird Sanctuary, an individual of this species that, according to local residents, had been there for several days.

On July 9, 1933, in ascending the St. Paul's or Esquimaux River, which is the easternmost large river on the north shore of the Gulf of St. Lawrence, to a point about 12 miles above its mouth, I saw 2 Belted Kingfishers several miles apart. They probably represented two breeding pairs. A local man familiar with the river told me that these birds nested regularly along its course.

Colaptes auratus luteus. NORTHERN FLICKER.—A Flicker was heard calling several times, but was not seen, near the mouth of Cross River, 7 miles west of Harrington Harbour, on August 14, 1932. I have no record of any other observation of a Flicker on this coast east of Natashquan.

Iridoprocne bicolor. TREE SWALLOW.—A nest of this species, on which one parent was incubating, was found on June 21, 1932, only 3 or 4 feet above the ground, in a dead, upright tree trunk less than 5 inches in greatest diameter, standing alone in the open, about a quarter of a mile inland from the mouth of the Little Watshishu River, and about 9 miles east of Baie Johan Beetz. As far as I have been able to ascertain, this is the easternmost nesting record of the Tree Swallow near the coast in this region.

Sitta canadensis. RED-BREASTED NUTHATCH.—The summer of 1933 was marked by another invasion of the sub-arctic coastal strip of the eastern part of the north shore of the Gulf of St. Lawrence by birds of this species. My notes show the following records of their occurrence there:

August 6.	Harrington Harbour, 1.
August 11.	Lourdes de Blanc Sablon, 1 on woodpile.
August 12.	Greenly Island, 4 alive and 1 that had been dead but a short time.
August 18.	La Tabatière, 1.
August 22.	Between Harrington Harbour and Etamamu River, 3.
August 23.	Between Etamamu River and Washikuti, 3, of which 2 were on the small island on which Cape Whittle lighthouse stands.

The keeper of Cape Whittle light told me on August 23rd that birds of this kind had been frequent visitors to his island for some time prior to that date.

Similar occurrences of Red-breasted Nuthatches in this sub-arctic coastal strip were

[10] *Can. Field-Nat,* 45: 74.

observed by me in 1921, 1923, and 1929, and the records of them have been published previously.[11] The manner of these occurrences is such as to make it seem probable that, for some reason unknown, the birds have sallied forth to the bare hills and islands of the outermost coastal region after the conclusion of their breeding season in the partly forested interior north of this shore.

The records for Lourdes de Blanc Sablon and Greenly Island, as given above, are the easternmost records for this species on the north shore of the Gulf of St. Lawrence. According to Dr. O. L. Austin, Jr.,[12] there is no certain record of the occurrence of this Nuthatch in Newfoundland Labrador, but, since Lourdes de Blanc Sablon and Greenly Island are only 4 miles west of the boundary of that region, it is quite probable that records of the occurrence of this species in it might have been made easily in August, 1933, had any competent observers been present then on the northwest shore of the Strait of Belle Isle.

**Sialia sialis sialis.* EASTERN BLUEBIRD. — About 7.00 a.m. on June 22, 1931, in the village of Havre St. Pierre (formerly Esquimaux Point), I heard the gentle call-note of a Bluebird and, a moment later, saw two Bluebirds in flight. They alighted near me and spent several minutes in the vicinity and I had plenty of time to observe them in excellent light, with X6 binoculars, at a few yards' distance, and so to confirm the identification. They were both in the dull plumage of the female. The reddish-brown breast, blue lower back, gray wings, tail and head, and characteristic bill were all seen distinctly.

This is the first record of the Eastern Bluebird in the Labrador Peninsula.

Bombycilla cedrorum. CEDAR WAXWING. — Two Cedar Waxwings were seen at Matamek on July 30, 1931. Two individuals of the same species were seen at Natashquan, in woodland between the village and the mouth of the Big Natashquan River, on June 29, 1932.

The Natashquan record just given is the easternmost record for this species on the north shore of the Gulf of St. Lawrence, the previous most easterly record being one for Baie Johan Beetz (formerly Piashte Bay).[13]

Sturnus vulgaris vulgaris. STARLING.—A flock of five Starlings was seen about sunset on June 13, 1933, in conifers at the border of a grassy clearing at Betchewun. They seemed very shy and wild. Apparently they had gone to roost for the night, but when I approached them they flew a short distance to another tree, then, after a pause, flew away out of sight.

One Starling was seen near the wharf at Natashquan on June 17, 1933.[14]

Vermivora ruficapilla ruficapilla. NASHVILLE WARBLER.—One was observed on June 28, 1932, near the second falls of the Big Natashquan River. This is the easternmost record for the species in this region, for it had not previously been definitely recorded on this coast east of Baie Joahn Beetz (Piashte Bay), where I noted two individuals on June 16, 1921.[15]

Dendroica æstiva æstiva. EASTERN YELLOW WARBLER.—This species was observed at Blanc Sablon on July 14, 1931 (2 individuals) and July 18, 1932 (1 individual).

Dendroica castanea. BAY-BREASTED WARBLER.— On the north side of the Big Natashquan River, near its mouth, in a rather open growth of medium-sized white spruces, I heard, on June 29, 1932, the song of a Bay-breasted Warbler. I traced it to its source and found a handsome male of this species feeding near the tips of the branches of a spruce in such a way as to display his elegant markings unusually well, and repeating his song at frequent intervals. I observed the bird most satisfactorily for about one minute at a distance of 30 feet with X6 binoculars.

This is the fourth record of this species in the Labrador Peninsula and the easternmost one for the north shore of the Gulf of St. Lawrence. It was found by L. M. Turner at Hamilton Inlet, July 9, 1882[16], by the present writer at Baie Johan Beetz (Piashte Bay), June 16, 1921,[17] and by P. A. Taverner at Matamek, June 11, 1928.[18]

Setophaga ruticilla. AMERICAN REDSTART — In a letter dated September 1, 1931, Mr. Fred W. Osborne, keeper of the light on St. Mary Islands and caretaker of the bird sanctuary at that place, has furnished me with the following records of this species at his light-station:

[11] *Auk*, 39: 516. *Auk*, 42:86. *Can. Field-Nat.*. 44:111.
[12] Birds of Newfoundland Labrador, Mem. Nutt. Orn. Club No VII, Cambridge, 1932, p. 169.
[13] *Auk*, 39: 515.
[14] *Auk*, 51: 89.
[15] *Auk*, 39: 515.
[16] *Proc. U. S. Nat. Mus.*, 8: 237.
[17] *Auk*, 39: 515.
[18] *Can. Field-Nat.*, 43: 79.

August 25, 1930. A female captured.
September 16, 1930. A male captured.
September 1, 1931. A male captured by Mr. Osborne in his bedroom.

In each case Mr. Osborne determined the identity of the captured bird by comparing it directly with the coloured illustrations in a pocket bird-guide. This method is probably sufficient in the case of this distinctly-marked species.

Molothrus ater ater. EASTERN COWBIRD. — On August 6, 1933, I watched an adult male Eastern Cowbird clearly for some minutes in favourable light at a distance of 30 to 40 feet near the school-house on Hospital Island, Harrington Harbour. The coffee-brown head and neck, black body, wings, and tail, and stout, conical bill were plainly seen. The bird was perching and making occasional short flights in the immediate vicinity of two cows, which are rather rare animals in this region.

The only other record of this species in the Labrador Peninsula is that of P. A. Taverner,[19] who records 3 or 4 seen, of which 2 were taken, in the summer of 1928 at Matamek, 286 miles west of Harrington Harbour.

Carpodacus purpureus purpureus. EASTERN PURPLE FINCH.—I wish to record observations of birds of this species at Natashquan as follows:

June 26, 1931. One.
July 23, 1931. One.
June 29, 1932. One.
June 30, 1932. One.

Loxia leucoptera. WHITE-WINGED CROSSBILL. — This species is fairly common in summer on the western part of the north shore of the Gulf of St. Lawrence, as is well known, but I do not often see it on the eastern part of that coast. Therefore it seems desirable to record that I saw 2 individuals on Perroquet Island, in Bradore Bay, on July 12, 1931. This island is treeless.

Melospiza melodia melodia. EASTERN SONG SPARROW.—A bird of this species in song was observed at Romaine (Gethsemani) on June 21, 1933, and again on July 22 in the same year.

[19] *Can. Field-Nat.*, 43 : 78-79.

NOTE ON THE AGE OF LAND SHELLS IN THE MARL DEPOSITS OF McKAY LAKE NEAR OTTAWA, ONTARIO

By G. E. FAIRBAIRN

THE first mention of land shells in the marl deposits of McKay Lake, was by Dr. H. M. Ami in 1884 in *Ottawa Field-Naturalists' Club, Trans.* No. 5, Vol. 2. p. 62, 1883-4 in which he mentions *Mesodon albolabris* (Say), *Mesodon sayii* (Binney), *Mesodon* var. *dentifera* (Binney), and *Patula alternata* (Say), and places them along with the freshwater species, under the heading of Alluvium (Shell Marl) Deposits, no mention being made as to how they came into the marl or at what time they were deposited.

In a report by F. R. Latchford and P. S. Porier, March 4th, 1886, in *Ottawa Field Naturalists' Club, Trans.* No. 7, Vol. II, p. 351, 1885-86, the authors note that "the shell marl [of Hemlock (McKay) Lake] is entirely fluviatile in its origin and all land shells found in it are recent."

In 1921, E. J. Whittaker made a report on the Fossil Mollusca of the Marl Deposits of the Ottawa District, Bull. 33, Geological Survey of Canada, Geological Series 40, p. 61, in which he says: "In addition to the freshwater species, a few terrestrial molluscs which are found in the marl beds are included in the description of the fauna. Such forms, of course, have been washed accidently into the water." The above excerpts seem to cover any mention of land shells found in the marl deposits of McKay Lake and it is noted that there appears to be a difference of opinion as to how and when they were deposited.

In view of this difference of opinion, the writer was attracted to this area for further study of the marl deposits and believes that his findings justify record. A small collection of *Polygyra albolabris* (Say), *P. sayana* (Pils.,) *P. monodon* (Rackett), and *Anguispira alternata* (Say), was gathered from the marl deposits at McKay Lake in the spring of 1933; specimens were collected at various depths from the surface and local conditions noted, as follows:

The species collected are terrestrial, whereas the marl in which they occur was deposited under water, and although found associated with various species of freshwater shells, this was not their true habitat and they are derived from nearby land surfaces and were buried in the marl at a later period than that in which it was formed.

This note is an attempt to explain the presence of these shells in a place where they could not have lived and the explanation may be that, the surface of the ground above the marl having numerous pits and mounds caused by the burrowing of ground hogs and other small land animals, these shells have fallen in and become imprisoned.

In searching for live specimens of the above species on the same date, it was found that they were plentiful on the surface of the marl in pits under small pieces of dead wood and leaves.

It is believed that on account of the excellent drainage of the marl caused by the underlying sand beds the pits become ideal hibernating places for the larger terrestrial species, with low loss of life from drowning in the spring.

There would be, however, a number of them lost through falling into the burrows and through caving of the pits where they would remain buried until exposed by further burrowing or the cutting back of the face of the sand pits as excavations are carried on from year to year. From the age of the trees growing on the mounds over the marl deposits, it is thought that burrowing has been going on in this formation for a long time. It is also noted that the shells collected from the marl, vary as to the condition of the epidermis, from those in which it is well preserved (as in a live specimen) to those in which it is completely removed, and also show all stages of bleaching in contrast to the freshwater shells. This may suggest that they were buried in the marl at different times and at a much later date than the freshwater species.

The assumption is that most of the land shells in the marl are more recent in age than the marl itself and probably all were introduced into the marl after the drop in the level of the lake.

NOTES AND OBSERVATIONS

UNUSUAL MIGRATION OF WILLOW PTARMIGAN INTO CENTRAL ALBERTA DURING THE WINTER OF 1933-34.—Considerable numbers of Willow Ptarmigan (*Lagopus l. albus*) have made their appearance during the present winter in the country immediately north and east of Edmonton, no doubt as a result of the deep snows and extremely low temperatures that have prevailed in the far-north since early in December. According to official records, unprecedented cold has been experienced in the lower Mackenzie region since the commencement of winter, with temperatures of 50° and 60° below zero. Unofficial reports of 70° and more degrees below zero have been common. Correspondents in the affected territory refer to the incursion of Ptarmigan in such terms as the following; "quite plentiful" "a few seen" "common and very tame" A dispatch from Ashmont to an Edmonton newspaper, dated January 3rd, 1934, states "Numbers of white ptarmigan have been seen lately, as many as 25 to 30 being seen in a flock". Ashmont is about 80 miles north and somewhat east of Camrose. At Tawatinaw, 60 miles north of Edmonton, Ptarmigan have been reported several times, while at Athabaska, a few miles farther north, quite a number have been seen. The most southerly point from which the birds have been reported this winter is Ardrossan, a hamlet, a few miles south east of Edmonton.—FRANK L. FARLEY, *Camrose, Alberta.*

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The official publications of THE OTTAWA FIELD-NATURALISTS' CLUB have been issued since 1879. The first were *The Transactions of the Ottawa Field-Naturalists' Club*, 1879-1886, two volumes; the next, *The Ottawa Naturalist*, 1886-1919, thirty-two volumes; and these have been continued by *The Canadian Field-Naturalist* to date. *The Canadian Field-Naturalist* is issued monthly, except for the months of June, July and August. Its scope is the publication of the results of original research in all departments of Natural History.

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ICHTHYOLOGICAL TREASURES FROM THE "ALBATROSS" EXPEDITIONS IN CANADIAN WATERS

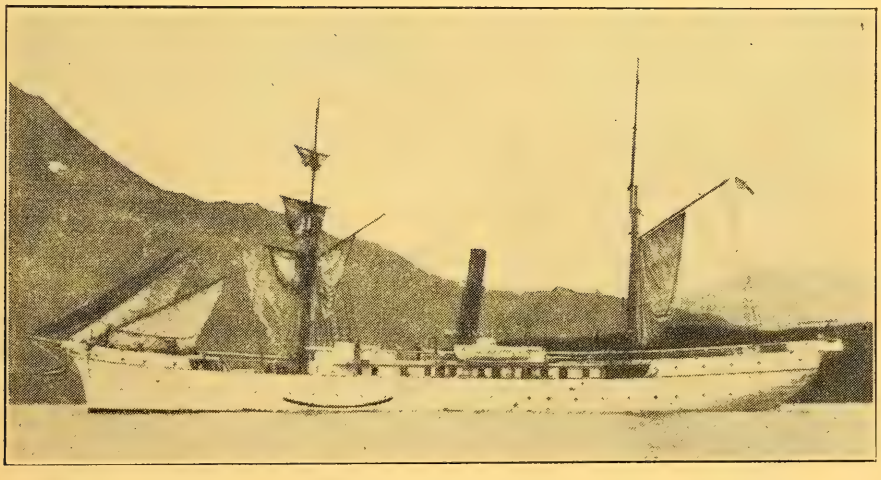
By G. V. WILBY
Pacific Biological Station, Nanaimo, B.C.

IN SEARCHING the literature for records of marine fishes taken along the coast of British Columbia, the writer became impressed with the wealth and uniqueness of the data secured by expeditions of the steamer *Albatross* of the United States Fish Commission.

As many of the catch records of the fishes taken by the *Albatross* were designated by dredging and trawling station numbers only, a careful check was made of the latitude and longitude of all these stations from the time that the vessel arrived on the Pacific in March 1888, until her final trip to Japan in 1906. (*Docs. 472, 549, 604, 621, U.S. Bur. Fish.*)

When these positions were located it soon became apparent that many of the records, presumably off Washington or Alaska, were taken along the British Columbia coast and actually within the territorial boundaries. Forty-three hauls were made in British Columbia waters or off the coast, from twenty-five of which fishes were obtained. Included in the latter was one of the most important hauls ever made of fishes rarely taken, at station 3342 off the Queen Charlotte Islands at a depth of 1588 fathoms. Seven species were taken here, in as many genera, six new to science, i.e. *Raja abyssicola* Gilbert, *Lampanyctus nannochir* (Gilbert), *Dolloa cyclolepis* (Gilbert), *Chalinura filifera* Gilbert, *Careproctus ovigerum* (Gilbert), *Derepodichthys alepidotus* Gilbert. Although these species were obtained as long ago as 1889 they have not been taken since.

The *Albatross* made six voyages between 1888 and 1906 during which collections were made in Canadian waters. Besides the dredging and trawling some fishing was done with hook and line, seine hauls were taken and



THE ALBATROSS
(Illustration copied from U.S.B.F. Doc. 472, 1901.)

shore collections were made. Since these are specifically mentioned as associated with some bay, harbour, etc., their records do not enter within the scope of this article.

The first voyage, in 1888, was from Alaska to Washington (U.S. Bur. Fish. 1901). Twelve stations were taken west of the Queen Charlotte Islands and off the west coast of Vancouver Island. (Nos. 2860 to 2881.

In 1889 station 3342 was taken in 1588 fathoms off Moresby Island in the Queen Charlotte group while en route from Alaska to California. This was the only station taken but it proved to be one of the richest, as mentioned above.

In 1891, after a voyage to the Bering Sea, and before going to the Hawaiian Islands, twelve stations were taken in the Strait of Juan de Fuca as the *Albatross* worked back and forth across the International Boundary line from east to west and back. These hauls were all successful except two.

In June, 1903, (U.S. Bur. Fish. 1904) eight stations, (Nos. 4191 to 4198), were taken in the Strait of Georgia between Nanaimo and Bowen Island and six stations, (Nos. 4199 to 4204), were taken in Queen Charlotte Sound off Fort Rupert before returning to Puget Sound.

In 1905, during another voyage to Alaska, stations 4744 and 4745 were taken in Queen Charlotte Sound and Hecate Strait and upon the return trip station 4755 was taken off the mouth of the Fraser river opposite the International Boundary line, but no fishes were caught.

In 1906, (U.S. Bur. Fish. 1907), the *Albatross* worked station 4758 off Cape St. James, in 1600 fathoms, while en route to Japan. One fish was taken, *Bathylagus milleri* Jordan and Gilbert.

As the locations of these stations are obscured by two different methods of recording, and the documents involved are not readily accessible to all readers, an abstract has been prepared of the dates, station numbers, (underlined if fish were taken), position, depth in fathoms, type of bottom and locality of the dredging and trawling done in British Columbia waters by the Albatross.

Date	Station	North	West	Depth	Bottom	Locality
1. 1888 and 1889 inclusive. (U.S. Bur. Fish. 1901).						
1888						
Aug. 29	2860	51°23′	123°34′	876 fm.	gn. M.	W. of Qn. Char. Is.
31	2861	51 14	129 50	204	— —	N. W. of Cape Scott
	2862	50 49	127 36	238	gy. S. P.	Fort Rupert
Sept. 24	2873, 2874, 2875	48 30	124 57	40	rky.	Swiftsure bank
25	2876, 2877	48 33	124 53	59	bk S. M.	Swiftsure bank
	2878	48 37	125 32	66	P.	Off Cape Beale
	2879, 2880	48 53	125 48	34	R.	N. W. of Barkley Sd.
	2881	49 00	125 48	24	gy. S.	N. W. of Amphitrite Pt.
1889						
Sept. 3	3342	52 39	132 38	1588	gr. Oz. crs. S.	W. of Moresby Is.
1891						
Aug. 27	3444	48 16	123 29	80	gn. M.P.	Off Race Rocks
	3445	48 16	123 45	100	rky.	W. of Race Rocks.
	3446	48 18	123 58	100	bn. M.	Strait of Juan de Fuca
28	3447	48 30	124 36	116	gy. S.	Off Port San Juan

Date		Station	North	West	Depth	Bottom	Locality
		3448	48 31	124 39	98	gy. S.	W. of Port San Juan
		3449	48 29	124 40	135	gy. S.	W. of Port San Juan
Sept.	1	3456	48 31	124 43	136	gy. S.	W. of Port San Juan
	2	3459	48 24	124 24	123	gy. S. P.	S. of Port San Juan
		3460	48 25	124 10	53	gy. S.	W. of Jordan River
Sept.	3	3462	48 15	123 35	92	dk. S. rky.	Off Race Rocks
	4	3465	48 21	123 14	48	rky.	E. of Victoria
		3466	48 18	123 22	56	gy. S. Sh. rky.	S. of Victoria
		2. 1903 (U.S. Bur. Fish. 1904)					
1903							
June	19	4191	49 11	123 54	54	fne. dk. S. M. rky	Nanaimo Harbour
		4192	49 14	123 54	89	gn. M. fne. S.	Nanaimo Harbour
	20	4193	49 20	123 43	23	gn. M. fne. S.	Strait of Georgia
		4194	49 19	123 43	111	sft. gn. M.	Strait of Georgia
		4195	49 20	123 43	14	fne. gy. S. gy. M.	Strait of Georgia
		4196	49 20	123 44	90	fne. gy. S.	
		4197	49 22	123 43	90	stk. gn. M. fne. S.	Strait of Georgia.
		4198	49 19	123 47	157	sft. gn. M.	Off Entrance Is.
	25	4199	50 48	127 15	107	sft. gn. M. vol. S.	Off Fort Rupert
		4200	50 46	127 17	111	sft. gn. M.S.	Off Fort Rupert
		4201	50 45	127 16	138	sft. gn. M. S. brk. Sh.	Fort Rupert
		4202	50 45	127 24	36	gy. S. Sh.	Fort Rupert
		4203	50 42	127 21	25	vol. S.G. brk. Sh. Spg.	Fort Rupert
		4204	50 43	127 19	69	gn. M. vol. S. G. Spg.	Fort Rupert
		3. 1905 (U.S. Bur. Fish. 1906).					
1905							
June	26	4744	51 21	127 52	56	fne. S.	On. Char. Sd.
	28	4745	54 00	130 11	31	gy. S.	Hecate Strait
Nov.	16	4755	49 06	123 21	120	M.	Opp. Intl. Bdry.
		4. 1906 (U.S. Bur. Fish. 1907)					
1906							
May	19	4758	52 02	132 31	1600		S. W. of Moresby Is.

The abbreviations used in this article are as follows: bk., black; bn., brown; brk., broken; crs., coarse; dk., dark; fm., fathom; fne., fine; G., gravel; gn., green; gy., grey; M., mud; Oz., ooze; P., pebbles; R., rocks; rky., rocky; S., sand; sft., soft; Sh., shale; Spg., sponge; stk., sticky; vol., volcanic.

The following list comprises the fishes taken at these stations with revised nomenclature, (with original synonymy in brackets), references to publications, and station numbers. New species marked (n.s.). Only published record from British Columbia are marked (*).

Name	Reference	Station Number
RAJIDAE—Skates		
Raja stellulata Jordan and Gilbert*	(Gilbert)	3447, 3466.
" binoculata Girard	(E. and G.)	4192.
" abyssicola Gilbert (n.s.)*	(Gilbert)	3342.
CHIMAERIDAE—Rat fishes		
Hydrolagus colliei (Lay and Bennett)	(Gilbert)	3447.
	(E. and G.)	4191, 4197, 4201.
MICROSTOMIDAE—Small-mouthed smelts.		
Bathylagus milleri Jordan and Gilbert*	(G. and B.)	4758.
CHAULIODONTIDAE—Viper fishes		
Chauliodus macouni Bean (n.s.)*	(Bean)	2860.
MYCTOPHIDAE—Lantern fishes		
Lampanyctus nannochir (Gilbert)*	(Gilbert)	3342.
(Nannobrachium)		
Diaphus theta Eigenmann and Eigenmann*	(Gilbert)	3459.
MACROURIDAE—Grenadiers		
Dolloa cyclolepis (Gilbert) (n.s.)*	(Gilbert)	3342.
(Nematonurus)		
Chalinura filifera Gilbert (n.s.)*	(Gilbert)	3342.
GADIDAE—Codfishes		
Microgadus proximus (Ayres)	(E. and G.)	4202.
(Eleginus navaga)		
Gadus macrocephalus Tilesius	(Gilbert)	3447, 3460, 3462.
Antimora microlepis Bean (n.s.)*	(Bean)	2860.
	(Gilbert)	3342.
HIPPOGLOSSIDAE—Halibuts		
Atheresthes stomias (Jordan and Gilbert)	(Gilbert)	3448, 3460, 3466.
Lyopsetta exilis (Jordan and Gilbert)	(E. and G.)	4191, 4194, 4197.
Hippoglossoides elassodon Jordan and Gilbert	(Gilbert)	3460.
PLEURONECTIDAE—Flounders		
Parophrys vetulus Girard	(Gilbert)	3460.
Lepidopsetta bilineata (Ayres)	(E. and G.)	4193.
Errex zachirus (Lockington)	(Gilbert)	3447, 3448, 3456, 3460.
(Glyptocephalus)		
(")	(E. and G.)	4201.
Microstomus pacificus (Lockington)	(Gilbert)	3447, 3466.
SCORPAENIDAE—Rock fishes		
Sebastolobus alascanus Bean*	(Hubbs)	2862.
	(Gilbert)	3460.
Sebastodes pinniger (Gill)	(E. and G.)	4193.
" alutus (Gilbert)*	(Gilbert)	3449, 3459, 3462.
" diploproa (Gilbert)*	(E. and G.)	4191.
" caurinus (Richardson)	(Gilbert)	3449.
" nebulosus (Ayres)*	(E. and G.)	4204.
COTTIDAE—Sculpins		
Icelinæ		
Tarandichthys filamentosus (Gilbert)*	(E. and G.)	4193.
" tenuis (Gilbert)*	(E. and G.)	4193, 4204.
Icelinus borealis Gilbert*	(Gilbert)	3460, 3465, 3466.
Triglops beani Gilbert*	(Gilbert)	3465
Radulinus asprellus Gilbert*	(E. and G.)	4191, 4204.
Cottinæ		
Dasycottus setiger Bean*	(E. and G.)	4191.
Malacocottus zonurus Bean*	(E. and G.)	4198.
Blepsiinæ		
Nautichthys oculofasciatus (Girard)	(Gilbert)	3465.
Psychrolutinæ		
Psychrolutes paradoxus Günther	(Gilbert)	3460.
(Psychrolutes zebra Bean)		
RHAMPHOCOTTIDAE—Large-headed sculpins		
Rhamphocottus richardsoni Günther	(E. and G.)	4197, 4204.

Name	Reference	Station Number
AGONIDAE—Sea-poachers		
Hypsagonus quadricornis (Cuvier and Valenciennes)*	(Gilbert)	3465.
	(E. and G.)	4204.
Bathyagonus nigripinnis Gilbert*	(E. and G.)	4191, 4198.
Asterotheca pentacantha (Gilbert)* (Xenochirus)	(E. and G.)	4193.
Asterotheca alascana (Gilbert)* (Xenochirus)	(Gilbert)	3445, 3446, 3456, 3459.
Odontopyxis trispinosus Lockington	(E. and G.)	4193.
Anoplagonus inermis (Günther) (Aspidophoroides)	(Gilbert)	3465.
LIPARIDAE—Liparids		
Liparis cyclopus Günther	(Gilbert)	3445.
" fucensis Gilbert*	(Gilbert)	3445, 3459.
" dennyi Jordan and Starks*	(Gilbert)	3445, 3459, 3460, 3465, 3466.
Careproctus ovigerum (Gilbert) (n.s.)* (Bathyphasma)	(Gilbert)	3342.
Careproctus gilberti Burke*	(Burke)	2862.
" melanurus Gilbert*	(Burke)	2860.
Paraliparis deani Burke*	(Burke)	4194.
(in E. and G. as *Paraliparis holomelas;* also from 4202 in E. and G. but in Burke as 4203).		
BATHYMASTERIDAE—Ronquils		
Ronquilus jordani (Gilbert)*	(Gilbert)	3465.
	(E. and G.)	4193, 4197, 4204.
BLENNIIDAE—Blennies		
Bryostemma decoratum Jordan and Snyder (Chirolophus polyactocephalus)	(Gilbert)	3465.
ZOARCIDAE—Eel pouts		
Lycodes brevipes Bean*	(E. and G.)	4201.
Furcimanus diapterus (Gilbert)	(E. and G.)	4198.
Bothrocara mollis Bean (n.s.)*	(Bean)	2860.
DEREPODICHTHYIDAE—Cusk pouts.		
Derepodichthys alepidotus Gilbert (n.s.)*	(Gilbert)	3342.

Although the *Albatross* collections were successful in taking fish at only 25 stations, 55 species were obtained which represent about ¼ of the total number of fishes known at the present time to be in British Columbia waters. Since there are no other records published of 34 of these fishes being taken in this Province, representing approximately 1/6 of our known species, the results of this review indicate:

1. A wealth of species actually recorded but obscured by the method of publication.
2. The possibility of many further valuable discoveries, especially in deep waters, as indicated by the richness of the comparatively small number of samples already taken from such a vast and prolific area.

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VASCULAR PLANTS COLLECTED DURING THE CANADIAN HUDSON STRAIT EXPEDITION IN 1927.

By FRITS JOHANSEN

INTRODUCTION

DURING the season (July-October) of 1927, I was attached, as naturalist, to the Canadian Hudson Strait Expedition. While my main work there was zoological, as (partly) recorded in *The Canadian Field-Naturalist*, 45: 80-83, 1931, Ottawa, I also collected a number of plants, at the five localities where I was ashore for shorter or longer time. These plants have been kindly identified by the late Prof. C. H. Ostenfeld of Copenhagen who, together with the late Dr. M. O. Malte, of Ottawa, was engaged in a comprehensive study of the arctic flora. Prof. Ostenfeld informed me in a letter (dated February 3, 1930) that these plants from Hudson Strait, 1927, contained several interesting records. Owing to the death of Prof. Ostenfeld, and to the scarcity of published records for plants from Hudson Strait, I deem it advisable and of interest to make this collection known.

The five localities are: (1) *Port Burwell*, Ungava, on the south side of the eastern end of Hudson Strait, where I stayed from September 12 to October 3; (2) *Lake Harbour*, on the south coast of Baffin Island (on the north side of the middle of Hudson Strait), where I was ashore on August 23; (3) *Wakeham Bay*, Ungava, on the south side of the middle of Hudson Strait, where I stayed from August 24 to September 10, and from October 5 to October 15; (4) *Eric Cove*, (Cape Wolstenholme), Ungava, on the south side of the western end of Hudson Strait, where I was ashore on August 1-3; (5) *Nottingham Island*, in the western end of Hudson Strait, where I stayed from August 4-17. A summary of my observations on the natural features of importance to the vegetation at each of these five localities, together with Prof. Ostenfeld's lists of the plants I collected there, follows. About 110 species in all were secured.

I. PORT BURWELL, UNGAVA

See detail-map made by Miles and King in 1910.

This harbour lies upon the west side of Cape Chidley Island, the latter being separated by McLean Strait from the mainland of Labrador-Ungava. A smaller island, at low tide connected with the main island, forms the northside of the harbour.

The country consits of gneiss, in the form of rockbeds or higher cliffs, and as a whole it is very stony. There are no streams of any size on Cape Chidley Island, particularly not in the autumn, but only brooks, running into or from the various ponds or lakes lying in depressions among the rocks. The vegetation is mainly found on such valley stretches, around the fresh-water bodies or brackish-water lagoons; and at particularly favor-

able places it attains the form of shrubbery, composed of willows, birch, blue-berries, etc. But even the high cliffs exhibit other colours than that of stone: the lichens, mosses, a Crassulaceous plant (*Sedum*) and a fern (*Cystopteris*), etc., enlivening their vertical faces or crevices with grey, brown, red, or green colours, glittering in the sun.

The following plants were collected here, at Port Burwell, in the last half of September, 1927, a total of 52 species.

Cystopteris fragilis (L.) Bernh.
**Equisetum variegatum* Schleich.
" *arvense* Linn.
Lycopodium selago L., var. *appressum* Desv.
**Juncus castaneus* Sm.
Eriophorum Scheuchzeri Hoppe.
" *polystachyum* Linn. (=*E. angustifolium* Roth.)
Carex membranopacta Bailey.
Poa rigens Hartm. (=*P. arctica* R.Br.)
* " *alpina* Linn.
Trisetum spicatum (L.) Richt.
Salix speciosa Hook. & Arn. (?)
" *uva-ursi* Pursh.
" *arctica* Pall., var.
Polygonum viviparum Linn.
Oxyria digyna (L.) Hill.
Cerastium alpinum Linn.
Stellaria longipes Goldie.
" *humifusa* Rottb.
Honckenya Halianthus) peploides (L.) Ehrh.
Melandryum apetalum (L.) Fenzl.
Silene acaulis Linn.
**Ranunculus hyperboreus* Rottb.
* " *eradicatus* (Laest.) (=*Batrachium paucistamineum*, Tausch., var.)
**Arabis alpina* Linn.
Cochlearia officinalis L. var. *groenlandica* (L.) Gelert.
Draba alpina Linn.
* " *lactea* Adams. (=*D. Wahlenbergii* Hart.)
Eutrema edwardsii R. Br.
**Sedum roseum* (L.) (=*S. rhodiola* D.C.)
Saxifraga oppositifolia Linn.
" *aizoides* Linn.
" *cernua* Linn.
" *foliolosa* R. Br. (=*S. stellaris* L. var. *comosa* Poir.)
" *groenlandica* Linn. (=*S. caespitosa* L.)
Potentilla alpestris Hall. (=*P. maculata* Pourr.)
* " (*Comarum*) *palustris* (L.) Scop.
Dryas integrifolia M. Vahl.
Oxytropis terræ-novæ Fernald.
Epilobium (*Chamaenerion*) *latifolium* L. (Hook)
**Epilobium anagallidifolium* Lam. (=*E. alpinum* Linn.)
Hippuris vulgaris Linn.
Pyrola grandiflora Rad.
Arctostaphylos alpina (L.) Spreng.
Vaccinium vitis-idæa L., forma *pumilum* Horn.
" *uliginosum* L., var. *alpinum* Bigel.
Statice armeria L., var. *labradorica* Turcz. (=*Armeria elongata* Hoffm.)
**Veronica alpina* L., var. *Wormskioldii* Roem. & Sch.
Mertensia (*Stenhammaria*) *maritima* (L.) S. F. Gray.
Campanula rotundifolia Linn.
Taraxacum croceum Dahlst.
Erigeron unalaschkensis (D.C.) Vierh. (=*E. uniflorus* L., var. *unalaschkensis*)

II. LAKE HARBOUR. BAFFIN ISLAND

The place where I was ashore, at Lake Harbour, was in the outer part of the sailing-in to the post, where the "Larch" remained anchored, between a larger island (with an Eskimo camp on it) and the "Meta incognita" part of Baffin Island (also with an Eskimo camp), from 4 p.m. on August 22 to the next day's noon.

The coast of Baffin Island here consists of steep cliffs of gneiss and schists falling down to the sea; but with much vegetation, particularly around lakes and ponds, in the shelter of cliffs, and in the grassy gullies intersecting the coastal cliffs and containing the outlets from the fresh-water bodies inland. At these place, willow bushes sometimes reach almost to the knees, and a little inland shrubbery of low dwarf birches occurs. I followed a brook from the coast, up over the cliffs, to the lake it came from, at about 100 feet elevation, noticing on my way the progressing erosion, in the form of gravel débris, of the cliffs, when exposed to the air. The lake itself had a stony or gravelly bottom, and no vegetation extending out into it, though surrounded by a grassy swamp at its western end, and around its outlet at its east end.

The following plants were collected here, on "Meta incognita", on August 23, a total of 33 species.

**Lycopodium annotinum* L., var. *pungens* Desv.
Eriophorum Scheuchzeri Hoppe.
" *polystachyum* Linn. (=*E.angustifolium* Roth.)
Carex rigida Good.
* " *rariflora* Sm.
Poa rigens Hartm. (=*P. arctica* R.Br.)
Trisetum spicatum (L.) Richt.
Salix arctica Pall. x *S. glauca* L. (?)

Salix herbacea Linn.
Betula glandulosa Michx.
Polygonum viviparum Linn.
Oxyria digyna (L.) Hill.
Stellaria longipes Goldie.
Silene acaulis Linn.
**Ranunculus lapponicus* Linn.
Empetrum nigrum Linn, var. *hermaphroditum* (Lange) Hagerup
Saxifraga tricuspidata Rottb.
Dryas integrifolia M. Vahl.
Potentilla alpestris Hall. (=*P. maculata* Pourr.)
Epilobium (Chamænerion) latifolium (L.) Hook.
Hippuris vulgaris Linn.
Pyrola grandiflora Rad.
**Bryanthus (Phyllodoce) cæruleus* (L.) Dippel.
Arctostaphylos alpina (L.) Spreng.
Vaccinium vitis-idæa L., forma *pumilum* Hornem.
" *uliginosum* L., var. *alpinum* Bigel.
Diapensia lapponica Linn.
Cassiope tetragona (L.) D. Don.
* " *(Harrimanella) hypnoides* (L.) D. Don.
Ledum decumbens Lodd. (=*L. palustre* L., var, *decumbens*)
Pedicularis lapponica Linn.
Antennaria alpina (L.) Gaertn.
Taraxacum russeolum Dahlst.

III. WAKEHAM BAY, UNGAVA

The outer part of Wakeham Bay presents high, steep gneiss cliffs on both sides, intersected by cross-gullies, and hiding longitudinal valleys containing watercourses, lakes and ponds. At the middle part of the bay, however, a wide valley, divided at its mouth by a lower rocky hill, comes down to the sea in the form of a broad, coastal plain, upon which the buildings of the trading posts of the Hudson Bay Company and Revillon Frères are situated. Behind this lower rocky hill, most of the valley is taken up by a system of half a score of lakes, mutually connected, fed from the surrounding hill slopes, and with creek outlets in the above mentioned coastal plain. This chain of lakes stretches all the way to Joy Bay (the large wide bay east of Wakeham Bay); three of the lakes draining into Wakeham Bay, and six or seven of them into Joy Bay. I covered the whole stretch of these lakes out and back, on October 10th; finding that at the bottom of Joy Bay their creek outlets spread out over extensive mud-flats, boulder stretches and marshes, an entirely different coast-nature from the higher tundra-plain in the middle of Wakeham Bay. Proceeding further up Wakeham Bay one passes high steep cliffs, alternating with grassy slopes intersected by brooks; and finally reaches the bottom of the bay, where a river comes out among boulder- or gravel-flats, merging into marshes or higher tundra further up the wide, cliff-bordered valley here. I was here on September 1st.

The vegetation at Wakeham Bay is better than at Port Burwell and Lake Harbour; and particularly luxurious in protected cliff gullies, river banks or valley stretches, and on the ruins of old Eskimo stone-houses, situated on grassy promontories at the bay or along inland lakes. At such places a shrubbery of willows, birch, blueberries, etc., occurs; though certain species of plants (e.g. *Rubus chamæmorus*) are found only some distance inland.

The following plants were collected here, at Wakeham Bay, at the end of August, and beginning of September, a total of 70 species.

Cystopteris fragilis (L.) Bernh.
Equisetum arvense Linn.
Lycopodium selago L., var. *appressum* Desv.
Luzula confusa Lindeb.
" *nivalis* (Laest.), var. *longifolia* Beurl., var. & typ.
Eriophorum polystachion Linn. (=*E. angustifolium* Roth,)
Carex rigida Good.
" *membranopacta* Bailey.
Poa rigens Hartm.
* " *glauca* Vahl.
" *alpigena* Lindm.
Alopecurus alpinus Sm.
Arctagrostis latifolia (R. Br.) Griseb.
Trisetum spicatum (L.) Richt.
**Puccinellia retroflexa* (Curt.) Holmb.
Elymus arenarius Linn.
**Tofieldia palustris* Huds.
Betula glandulosa Michx.
Salix arctica Pall. x *S. glauca* Linn. (?)
" *uva-ursi* Pursh.
" sp. (*S. speciosa* Hook & Arn.?)
" *reticulata* Linn.
" *herbacea* Linn.
Polygonum viviparum Linn.
Oxyria digyna (L.) Hill.
Silene acaulis Linn.
Honckenya (Halianthus) peploides (L.) Ehrh.
Stellaria humifusa Rottb.
" *longipes* Goldie.
Cerastium alpinum Linn.
Melandryum affine Vahl.
**Ranunculus affinis* R. Br.
**Anemone Richardsonii* Hook.

Papaver radicatum Rottb. (= *P. nudicaule* Linn.)
Eutrema edwardsii R. Br.
Draba nivalis Liljebl.
" *alpina* Linn.
**Cochlearia officinalis* L., var. *arctica* Schlecht.
Empetrum nigrum L., var. *hermaphroditum* (Lange) Hagerup.
Saxifraga foliolosa R. Br. (=*S. stellaris* L., var. *comosa* Poir.)
" *tricuspidata* Rottb.
" *groenlandica* Linn. (=*S. cæspitosa* Linn.)
" *hirculus* Linn.
" *aizoides* Linn.
" *cernua* Linn.
Chrysosplenium alternifolium L., var. *tetrandrum* Lund.
**Parnassia Kotzebuei* Ch. & Schl.
**Rubus chamæmorus* Linn.
Dryas integrifolia M. Vahl.
Potentilla alpestris Hall. (=*P. maculata* Pourr.)
Astragalus alpinus Linn.
Oxytropis terræ-novæ Fernald.
Epilobium (*Chamænerion*) *latifolium* (L.) Hook.
Pyrola grandiflora Rad.
Cassiope tetragona (L.) D. Don.
Arctostaphylos alpina (L.) Spreng.
Ledum decumbens Lodd. (=*L. palustre* L., var. *decumbens* Ait.)
**Rhododendron lapponicum* (L.) Wg.
Vaccinium vitis-idæa L., var. *pumilum* Hornem.
" *uliginosum* L., var. *alpinum* Bigel.
Statice armeria L., var. *labradorica* Turcz. (= *Armeria elongata* Hoffm.)
Pedicularis hirsuta Linn.
" *lapponica* Linn.
Mertensia (*Stenhammaria*) *maritima* (L.) S. F. Gray.
Campanula uniflora Linn.
" *rotundifolia* Linn.
Antennaria alpina (L.) Gaertn.
Arnica alpina (L.) Olin.
Taraxacum russeolum Dahlst.
Erigeron unalaschkensis (D.C.) Vierh. (=*E. uniflorus* L., var. *unalaschkensis*).

IV. ERIC COVE, UNGAVA

The sides of Eric Cove (just east of Cape Wolstenholme) are formed by cliffs, up to 2000 feet high composed of Precambrian schists. Here and there, these cliffs are intersected by gullies by which they can be ascended; but the bottom of the cove is a wide expanse of sand and gravel, deposited by the river coming out here. The buildings of the Hudson Bay Company are situated upon this level, coastal plain, which gradually merges into a deep valley behind. The above mentioned river receives, during its course, a couple of tributary creeks (one of which comes down the western river slope through a cliff gorge up the valley) and many similar brooks; but there is no lake at its head.

The vegetation is fairly good, particularly in the swamps and protected places (banks, etc.) of the river, or in the cliff gullies leading up from its slopes, judging from my excursions several miles up the valley through which it runs in its middle and upper course. A detail map of Eric Cove was made by Hazen in 1912.

The following plants were collected here, at Eric Cove, during the first days of August, a total of 56 species.

Lycopodium selago L., var. *appressum* Desv.
**Luzula parviflora* (Ehrh.) Desv.
" *confusa* Lindeb.
" *nivalis* Laest., var. *longifolia* Beurl.
Eriophorum Scheuchzeri Hoppe.
" *polystachion* Linn. (=*E. angustifolium* Roth.)
Carex rigida Good.
" *membranopacta* Bailey.
Poa alpigena Lindm.
" *rigens* Hartm. (=*P. arctica* R. Br.)
Alopecurus alpinus Sm.
Arctagrostis latifolia (R. Br.) Griseb.
Hierochloë alpina R. & S.
**Festuca ovina* L., var. *brevifolia* R. Br.
Elymus arenarius Linn.
Salix arctica Pall. x *S. glauca* Linn. (?)
" *herbacea* Linn.
Polygonum viviparum Linn.
Oxyria digyna (L.) Hill.
Silene acaulis Linn.
Honckenya (*Halianthus*) *peploides* (L.) Ehrh.
Stellaria longipes Goldie.
Melandryum apetalum (L.) Fenzl.
" *affine* Vahl.
Cerastium alpinum Linn.
**Ranunculus nivalis* Linn.
* " *Sabinei* R. Br.
Papaver radicatum Rottb. (=*P. nudicaule* Linn.)
Eutrema Edwardsii R. Br.
**Draba hirta* Linn. (=*D. daurica* Df.)
" *nivalis* Liljebl.
Empetrum nigrum Linn.
Saxifraga foliolosa R. Br. (=*S. stellaris* L., var. *comosa* Poir.)
* " *nivalis* Linn.
" *grœnlandica* Linn. (=*S. cæspitosa* Linn.)
" *tricuspidata* Rottb.

Saxifraga cernua Linn.
Dryas integrifolia Vahl.
Potentilla alpestris Hall. (=*P. maculata* Pourr.)
Astragalus alpinus Linn.
**Oxytropis Maydelliana* Trautv.
Epilobium (*Chamænerion*) *latifolium* (L.) Hook.
Cassiope tetragona (L.) D. Don.
Ledum decumbens Lodd. (=*L. palustre* L., var. *decumbens* Ait.)
Diapensia lapponica Linn.
Vaccinium vitis-idæa L., var. *pumilum* Hornem.
" *uliginosum* L., var. *alpinum* Bigel.
Statice armeria L., var. *labradorica* Turcz. (= *Armeria elongata* Hoffm.)
Pedicularis hirsuta Linn.
" *lapponica* Linn.
Mertensia (*Stenhammaria*) *maritima* (L.) S. F. Gray.
Campanula uniflora Linn.
Antennaria alpina (L.) Gaertn.
Arnica alpina (L.) Olin.
Taraxacum croceum Dahlst.
**Erigeron uniflorus* Linn.

V. NOTTINGHAM ISLAND.

This island consists of gneiss-rocks, much glaciated, and forming island-like hummocks, surrounded by plains of boulder-clay of marine origin, stretching to an elevation of 50-100 feet inland. While R. Bell did not find any marine shells in the boulder-clay on the east side of the island, in 1884, I found, in 1927, great quantities of subfossil Mollusc shells (*Mya, Saxicava, Tellina*, etc.) on the south end of the island, in the boulder-clay, or washed out from it. The boulder-clay plains are often very extensive; and at many places come down to the sea (particularly at the head of bights or inlets) in the form of boulder strewn, sandy, gravel beaches or clay mudflats, alternating with stretches of rocky coast. The general nature of the island, as noticed by me on August 13 from one of the highest points on the south end (cairn with record built here), showed rocky ridges and outcrops intervening with, often extensive, valleys, partly filled by many lakes and ponds. There are apparently no rivers of any size upon the island; only creeks and brooks, connecting or running into or out of the various lakes and ponds. The large lakes are sometimes divided up by rocky islands or points, and have boulder-strewn margins. For botanical, entomological, and fresh-water biological collecting, it is therefore natural to follow the merging of the sea-coves into the inland valleys and plains, the vegetation being best developed here. The remains (stone-caches, shelters, etc.) of former Eskimo inhabitants of the island, are also found along this route. The greatest variety in the vegetation is, however, found near the coast, as proven also by the more barren nature of the animal life inland, compared to that nearer the sea. The more exposed islets off Nottingham have of course, few species of vascular plants; thus I found only half a dozen of them on one islet visited on August 15 (See list below.)

The following plants were collected here, on Nottingham Island, in the middle of August, a total of 40 species.

Lycopodium selago, L., var. *appressum* Desv.
Luzula confusa Lindeb.
Eriophorum Scheuchzeri Hoppe.
Alopecurus alpinus Sm.
**Dupontia Fischeri* R. Br.
**Puccinellia tenella* (Lange) O. R. Holmb. (from an islet off Nottingham Island only.)
Hierochloë alpina R. & Sch.
Salix arctica Pall. x *S. glauca* Linn. (?) (also from islet off Nottingham Island.)
" *herbacea* Linn.
" *reticulata* Linn.
Polygonum viviparum Linn.
Oxyria digyna (L.) Hill.
Honckenya (*Halianthus*) *peploides* (L.) Ehrh. (also from islet off Nottingham Island).
Silene acaulis Linn.
Stellaria longipes Goldie.
Cerastium alpinum Linn.
Melandryum apetalum (L.) Fenzl.
Ranunculus pygmæus Wg.
Papaver radicatum Rottb. (=*P. nudicaule* Linn.)
Draba nivalis Liljebl.
" *alpina* Linn.
**Cardamine pratensis* Linn.
Cochlearia officinalis L., var. *grœnlandica* (L.) Gelert.
Empetrum nigrum Linn.
Saxifraga grœnlandica Linn. (=*S. caespitosa* (Linn.) (also from islet off Nottingham Island).
" *tricuspidata* Rottb.
" *hirculus* Linn.
* " *rivularis* Linn. (from islet off Nottingham Island only).
" *oppositifolia* Linn (also from islet off Nottingham Island).
Chrysosplenium alternifolium L., var. *tetrandrum* Lund.
Dryas integrifolia M. Vahl.
Potentilla alpestris Hall (=*P. maculata* Pourr.)
Astragalus alpinus Linn.

Pyrola grandiflora Rad.
Cassiope tetragona (L.) D. Don.
Vaccinium uliginosum L., var. *alpinum* Bigel.
**Pedicularis lanata* Cham. & Schlecht.
Mertensia (*Stenhammaria*) *maritima* (L.) S. F. Gray (also from islet off Nottingham Island).
**Chrysanthemum integrifolium* Rich.
**Matricaria inodora* L., var. *grandiflora* Hook.

CONCLUSION.

It will be seen from the above that not less than 40 species of plants were observed only at one locality, thus emphasizing the floral variety in Hudson Strait. These forty species are marked with an asterisk in the lists above for each locality. Eleven of these were found at Port Burwell; five at Lake Harbour; nine at Wakeham Bay; eight at Eric Cove; and seven on Nottingham Island. Collections made by others in the same area will, of course, greatly reduce this number of species, when published. But at present, both these 40 species, and the other 70 odd species, also collected, form a working basis for future investigations of the vegetation in Hudson Strait. In this connection it is greatly to be wished that the large collections of plants made there by Canadian botanists may be published.

For photographs of the above mentioned localities, refer to: *Report of the Hudson Strait Expedition 1927-28* , Ottawa 1929, pp. 194-196, 201-203 (Port Burwell); 192-193, 198-200, 204, 207-208, 210 (Wakeham Bay); 185-191, 197-198, 206 (Nottingham Island).

NOTES ON THE FISH FAUNA OF AN EASTERN ONTARIO SHALLOW WATER LAKE

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KNOWLEDGE of the fish fauna of eastern Ontario is largely limited to the game and commercial species. The black basses, the lake trout and the whitefish have an extended literature but very few of the smaller fishes have been studied in this part of the province. In a general way it is known that certain types of fish are present, but there is no exact knowledge of where many of the smaller kinds may be found. Dymond *et al* (1929) has written of the fishes of Lake Ontario and Bishop (1931) reported on the fishes of the Upper St. Lawrence River. Hubbs and Brown (1929) listed some collections from the eastern end of Lake Ontario and the Upper St. Lawrence. The many small lakes of the eastern counties have been almost entirely neglected.

The present paper is preliminary to further studies on the lakes in the vicinity of Kingston, Ontario. It is hoped that lakes of the first and second orders (Chapman 1929, p. 305) will be examined another season. Long Lake, which is situated three-quarters of a mile north of the village of Verona, is one of the headwater lakes of the Napanee River. It is a typical example of Chapman's third order of lakes, that is, a shallow water lake without a thermocline. Its greatest depth is about 12 metres but half of it is less than 5 metres in depth. Roughly a mile and three-quarters in greatest length, its main axis is north and south. It is separated into three large arms or bays; with swamps near the ends, indicating that in former times the lake was much larger than it is at present. Three streams enter, and one leaves, the lake. None of these have much flow except during high water. Geologically, Long Lake is in a region of metamorphic rocks overlaid to a great extent by glacial till and gravel. The deepest portion of the lake is towards the eastern shore where it is borderd by steep, rocky hills. The land on the west shore of the lake is gently sloping. Several shoal areas are present, and in times of low water two of these appear at the surface as small islands.

Shallow water and vegetation are important factors in the production of fish in a lake. This is particularly true of the type of lake that is under review. The literature shows that these factors are recognized as important by the aquatic biologists. Adams and Hankinson (1926) found that shallow waters have the most varied conditions, because here are the greatest changes in temperature and in light, the greatest variety of vegetation and the feeding and breeding grounds of most of the fish and the main habitat of the young fish. Bensley (1915) says that the environ-

mental protection afforded by weeds enables a variety of smaller fishes and the young of larger fishes to maintain themselves against predatory fishes. Predatory forms themselves, find in swamp situations, an abundant and convenient food supply. Klugh (1926) suggested that the rooted aquatics might be used as an index to the productivity of a lake.

The large area of shoal water is productive of great quantities of vegetations. Emergent types such as *Typha*, *Zizania*, *Sagittaria*, *Scirpus* and floating types such as *Nymphæa* and *Castalia* are found in the shore zone. These are mainly to be seen along the west and south shores. In deeper water are found the submerged and free floating types, *Elodea* in the mouths of creeks and *Potamogeton*, *Myriophyllum*, *Utricularia*, *Vallisneria*, etc, over the shoals and in water to about 5 meters in depth.

There are great numbers of small fish of various species in the lake which form a link in the food chains of the larger game fishes. Fry and fingerlings of the game species are quite common. Both kinds use the weed beds for shelter as indicated in the seine hauls. The greatest numbers and varieties were taken over and among the weeds. Sight observation showed schools of many hundreds in similar situations. The guides and anglers recognize the importance of the outer edges of the weed beds as the best fishing grounds. All the large game fish taken during the survey were from the deeper water at the edges of the weed covered shoals.

The abundance of the food fishes and the young of the various species that the angler catches suggest that the lake could support many more game fishes than would seem to be present. Possibly, the planting of adult fish would be of advantage as many of the cyprinids and the smaller sunfish and perch would be used as food and removed as competitors of the young game fish. A complete stocking policy for the lake cannot be made until more data upon its ecology is available and this will in turn depend on further study of the lake.

The writers wish to thank Mr. E. Martin of Kingston for supplying transportation and the use of his cottage, Dr. Carl L. Hubbs and Dr. J. R. Greeley of the University of Michigan for identifying many of the fishes and the guides and residents of the vicinity for assistance in many ways. The collections made during the survey have been deposited in the Museum of Zoology, University of Michigan and in the Biological Museum, Queen's University. Hubbs (1926) (1929) and Hubbs and Greene (1928) have been followed in the naming of specimens.

ANNOTATED LIST.

1. *Salvelinus fontinalis* (Mitchill).
   The brook trout is found above Long Lake in a small stream tributary to Craig's Creek. A large individual of this species was taken from the lake by a tourist in the summer of 1933. This is the only *Salmonidæ* found in these waters. It is not native to the watershed but was introduced.
2. *Anguilla bostorensis* Le Sueur.
   Eels are quite common with many taken each summer by anglers.
3. *Catostomus commersonni* (Lacépède).
   About 1928 large numbers of common suckers were found dead in this lake. Ten adults were taken during the survey. Several of these were diseased.
4. *Moxostoma aureolum* (Le Sueur).
   The redfin sucker is a common fish of the watershed and was reported from Long Lake by reliable observers. Not taken during the survey.
5. *Notemigonus crysoleucas* (Mitchill).
   The golden shiner is one of the most common fish in the lake. A number were identified by Dr. Greeley as *N. c. auratus*.
6. *Notropis heterolepis* Eigenmann and Eigenmann.
   The black nose shiner is quite common in the submerged vegetation. Several were placed in the Museum of Zoology, University of Michigan.
7. *Notropis heterodon* Cope.
   This species resembles *N. heterolepis* very closely and is known by the same common name. They are quite plentiful in Long Lake. A number sent to the University of Michigan were identified by Dr. Greeley.
8. *Notropis cornutus* (Mitchill).
   Common shiners were in smaller numbers than some of the other cyprinids of the lake. Specimens were identified by Dr. Greeley as *N. c. fontalis*.
9. *Hyborhynchus notatus* (Rafinesque).
   The blunt nose minnow was taken over the submerged vegetation, and in bays of the east shore. This species and the golden shiner are regarded as the best bait for the game fish.
10. *Ameiurus nebulosus* (Le Sueur).
    A number of adult bullhead were taken in the hoopnets. A yearling was taken in a seine haul in shallow water. It is common in the creeks entering and leaving the lake.

11. *Esox lucius* Linnæus.
The pike in Long Lake are badly diseased. Lesions were found on the fins and sides of all those taken. These lesions look like large boils and have a blood-red raggedy appearance on the freshly caught fish. In one or two instances of fish found dead, these boils were the apparent cause of death. It is hoped that further investigations will be made on the cause of this disease.

12. *Umbra limi* (Kirtland).
The mud minnow was reported present. Occasionally used as bait in winter fishing through the ice.

13. *Perca flavescens* Mitchill.
One of the most abundant fishes in the lake. Heavily parasitized by encysted trematodes.

14. *Stizostedion vitreum* (Mitchill).
Great numbers of pike-perch are taken by the anglers every year. In former times these fish were speared while on the spawning beds. Spearing is now illegal and conditions have improved.

15. *Stizostedion glaucum* Hubbs.
Included here since a skin of this species was seen in the possession of a licensed guide. Apparently introduced by mistake for *S. vitreum.*

16. *Pœcilithys exilis* (Girard).
Only one specimen of the Iowa darter was taken during the survey. It was found in the sand bay of the eastern shore. Identified by Dr. Greeley.

17. *Percina caprodes* (Rafinesque).
The log perch was taken on the eastern shore and appeared to be common. Specimens from the lake were identified by Dr. Greeley as *P. c. semifasciata.*

18. *Helioperca macrochira* (Rafinesque).
The bluegill was found in numbers among the submerged vegetation and in the creeks and bays of the lake.

19. *Eupomotis gibbosus* (Linnæus).
The common sunfish is very abundant and every seinehaul took large numbers of this species. Hoop nets set in the outlet secured many adults.

20. *Eupomotis gibbosus* x *Helioperca macrochira.*
Hybrids between the common sunfish and the bluegill were the surprise of the survey. Dr. Greeley, who identified them, says that the ratio of hybrids to normal forms seems to be high in this lake.

21. *Pomoxis sparoides* (Lacépède).
The crappie was not taken by the authors but was reported present over the weedy shoals.

22. *Ambloplites rupestris* (Rafinesque).
The rock bass is not as common as might be expected. Large specimens were taken in quite shallow water.

23. *Aplites salmoides* (Lacépède).
The large mouth bass is a typical fish of this order of lake. Fingerlings were moderately common in the seinehauls among the lilypads and along the rocky shores.

24. *Micropterus dolomieu* (Lacépède).
The small mouth bass is common in the lake and good fishing is to be had during the season. Some planting of this species has been done by the Ontario Department of Game and Fisheries.

25. *Fundulus diaphanus* (Le Sueur).
This species of top-minnow was taken in the seinehauls along the gravel and sand beaches of the eastern shore. Dr. Greeley, to whom a number were submitted, reports them as intermediates between *F. d. diaphanus* and *F. d. menona.* It is interesting to note that Long Lake is apparently in the area where eastern and western forms intergrade. This has been observed by the senior author in a number of different forms and further collections will probably show still more of these intergrades.

26. *Lota maculosa* (Le Sueur).
The ling is common in deep water during the summer and moves inshore during the winter. Numbers have been taken in the outlet during the cold weather.

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SOREX PALUSTRIS BROOKSI, A NEW WATER SHREW FROM VANCOUVER ISLAND[1]

By RUDOLPH MARTIN ANDERSON

[1] Published with the permission of the acting Director, National Museum of Canada, Department of Mines, Ottawa.

ON MARCH 30, 1934, Major Allan Brooks, D.S.O., sent in a well-made skin with accompanying skull of a (nursing?) female Water Shrew from Comox, on the east coast of Vancouver Island, as a donation to the National Museum of Canada, suggesting that it was probably the first definite record of the subgenus *Neosorex* from Vancouver Island. Further investigations have not shown any further records of the Water Shrew from Vancouver Island, and comparison with about 70 specimens of Water Shrews from Eastern and Western Canada and with the literature on the subject shows that the Comox specimen has characters differentiating it from any of the named forms. In recognition of the work of Major Brooks as an artist, collector, and field-naturalist in British Columbia, and his valued services to the National Museum of Canada in sending specimens to this institution at various times from 1897 to the present time, the name *brooksi* is proposed for the Vancouver Island Water Shrew.

Sorex palustris brooksi new subspecies.

VANCOUVER ISLAND WATER SHREW.

TYPE.—Female adult, skin and skull, No. 12370, National Museum of Canada; Black Creek, 150 feet altitude, Comox district, east coast of Vancouver Island, British Columbia, latitude 49° 50′ north, longitude 125° 08′ west; March 29, 1934; collected by Allan Brooks.

GEOGRAPHIC DISTRIBUTION.—Known only from type locality, on Black Creek, about 14 miles northwest of Comox, Vancouver Island, British Columbia.

DIAGNOSTIC CHARACTERS.—Upper parts glossy black with sparse, very faint silvery tips on some hairs; under parts glossy hair brown, becoming paler on throat, fading to dull whitish around lips.

COLOUR.—Head, black, and tail uniform glossy black, with sparse, very faint silvery tips on some hairs; sides slightly grayish in colour; under parts glossy hair brown (Ridgway's Colour Standards and Nomenclature); tail dark fuscous above and around tip, under side of tail whitish near base, gradually becoming dusky towards tip.

EXTERNAL MEASUREMENTS.—*Type* (female): total length, 150 mm.; tail vertebræ, 70.5; hindfoot, 20.

SKULL.—Skull slightly longer than in *Sorex palustris navigator* (Baird), the nearest mainland form; cranium tapering more anteriorly, higher, and with pronounced sagittal ridge.

SKULL MEASUREMENTS.—*Type* (female): condylo-basal length, 20.3 mm.; palatal length, 9.0; cranial breadth, 9.8; interorbital breadth, 4.0; maxillary breadth, 6.0; maxillary tooth row, 7.5; mandibular tooth row, 6.0.

COMPARISONS.—Compared with a series of 27 specimens of *Sorex* (*Neosorex*) *palustris navigator* (Baird) from the mainland of British Columbia and 13 specimens of the same subspecies from Alberta, the Comox specimen is noticeably darker above, being almost black with very faint silvery tips on some of the hairs. The mainland specimens all look noticeably grayish in comparison. *S. p. navigator* specimens have the under parts smoke gray or pale smoke gray, more or less glossy or silvery, while *brooksi* has the under parts hair brown, giving a dusky appearance, glossy in certain lights. In dusky colour of the under parts, *brooksi* approaches *Sorex* (*Atophyrax*) *bendirii bendirii* (Merriam) in appearance, but somewhat lighter in colour than in any of 6 specimens of *bendirii* examined. *S. p. brooksi* also has the throat and chin much lighter in colour than in *bendirii* specimens examined, in this respect approaching the condition found in *Sorex palustris albibarbis* (Cope) which ranges from western New Brunswick through southern Quebec and Ontario. The skull of *brooksi* is slightly longer than in *navigator* with cranium tapering more anteriorly, higher, and with pronounced sagittal ridge not seen in any female specimens of *navigator*, and in only two male specimens of *navigator*, the development of sagittal ridge showing a tendency to approach the condition occurring in *Sorex alaskanus* Merriam which is known only from Glacier Bay, Alaska.

SPECIMENS EXAMINED.—One, from the type locality.

National Museum of Canada, Ottawa

A NEW SPECIES OF GYRAULUS FROM CANADA

By FRANK C. BAKER
Curator, Museum of Natural History, University of Illinois.

Gyraulus hornensis nov. sp.

Gyraulus arcticus Baker, Fresh Water Mollusca of Wisconsin, Vol. 1, p. 381, plate xxii, Fig. 34-37, 1928, Bul. 70, Wis. Geol. Nat. Hist. Surv.; Baker and Cahn, Freshwater Mollusca from Central Ontario, Annual Report, National Museum of Canada, 1929 p 59, 1931 (part). Not *Planorbis arcticus* (Beck MS) Möller, Index Moll. Greenland, p. 5, 1842.

Shell depressed, the periphery rounded; colour light corneous, surface shining; sculpture of fine, oblique lines of growth with very fine spiral lines, more or less conspicuous; nuclear whorls small, rounded, spirally striate in sculpture; whorls about four, rapidly enlarging, the last somewhat expanded near the aperture, roundly angled at the periphery of the last whorl, the upper part of the body whorl slightly flattened; spire flat, the whorls coiled in the same plane; the body whorl may be nearly in line with the spiral turns or it may be deflected about a third of the distance from the aperture; sutures deeply channelled; base concave exhibiting all of the whorls, the umbilical region wide, but the body whorl well rounded, not flattened or having a reamed-out appearance; aperture obliquely, ovately rounded; lip thin, sharp, simple, or slightly thickened with a callus deposit; parietal wall with a white callus.

Height	Gr. Diameter	Aperture height	Diameter in mm.	
1.5	4.5	1.2	1.5	Holotype
1.3	4.2	1.0	1.2	Paratype
2.0	4.6	1.5	1.6	Paratype

The last specimen with deflected body whorl.

TYPE LOCALITY: Birch Lake, Horn River, about 75 miles above the Mackenzie River, Mackenzie District, Canada. Collected by Mr. E. J. Whittaker, July, 1921.

TYPES: Museum of Natural History, University of Illinois, No. Z13072a.

This small planorbid was erroneously refered to *arcticus* in the Fresh Water Mollusca of Wisconsin. An examination of a specimen of *Gyraulus arcticus* from Greenland named by Mörch, in the U. S. National Museum, shows that the Greenland species is more nearly related to *Gyraulus deflectus* and not like any member of the *parvus* group. This specimen is shown at D in the figures. The new species, *hornensis*, is distinguished from its relatives by the rounded periphery of the body whorl and the rounded umbilical whorls of the base, especially the body whorl, these being flattened or excavated in related species such as *altissimus* and *parvus*. In *altissimus* the body whorl is flattened near the upper part and the aperture is very oblique and deflected (B in figure); in *cyclostomus* the aperture is large and rounded, not oblique, the shell is much larger (see C in figure), and the body whorl is almost round.

Hornensis is common in the Mackenzie River region west of Great Slave Lake as reported by Mr. Whittaker. It is also abundant in western Ontario and specimens are in the Natural History Museum from Wisconsin and North Dakota. It has been confused with *Gyraulus altissimus* which appears to be a composite species as usually recorded, including the true *altissimus* which was first known from Pleistocene deposits, and a flatter form with strongly reamed-out umbilical region. The relationships of these Pleistocene forms has not yet been satisfactorily worked out.

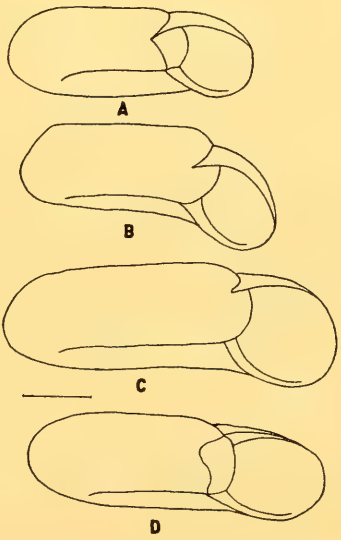

FIG. A. *Gyraulus hornensis* F. C. Baker, sp. nov., holotype, Birch Lake, Horn River, Mackenzie District.

FIG. B. *Gyraulus altissimus* (F. C. Baker) holotype, Urbana, Illinois, Pleistocene.

FIG. C. *Gyraulus cyclostomus* F. C. Baker, paratype, Rosetown, Saskatchewan, Pleistocene.

FIG. D. *Gyraulus arcticus* ('Beck' Möller), named by Mörch, from Julianehaab, Greenland (U.S. Nat. Mus., 180297). All figures enlarged, the line indicating one mm.

BOOK REVIEWS

THE ECOLOGY OF ANIMALS *By Charles Elton, Methuen & Co Ltd., Publishers, 36 Essex Street., London W. C. 2. 97 pp. 3s. 6d.*

This handy little volume is one of a series of monographs on biological subjects issued by this publisher. The object is to give a brief but authoritative account of the present state of knowledge in various departments of Biology with a view to making this account available to workers in other fields. The author has succeeded well in this aim for the subject of his choice, and teachers, students and general readers will find much food for thought in his treatment of the many ramifications of this section of biology, and will be saved from having to dig too deeply into the specialized literature of the subject for the summary they require. The chapter headings are "The Scope of Animal Ecology," "Ecological Surveys," "Animal Inter-relations," "Habitats," "Numbers: Statistics" "Numbers: Dynamics", and "Economic Problems."

All of us are caught willy-nilly in the chains that link together all life on this earth, and all of us should be interested in the inter-relations included in the ecological problem. The author shows how Ecology of animals affects such wide-spread interests as conservation, public health, agriculture, fisheries and many others, touching on each in a very readable manner. Because of the lack of adequate knowledge of this subject man has been making very serious errors since the days of the great plague, and without question he is still making them. A good start on this all-embracing field for naturalists is Mr. Elton's book.—H.L.

A HISTORY AND LIST OF BIRDS OF MIDDLESEX COUNTY, ONTARIO, *By W. E. Saunders and E. M. S. Dale. Reprinted from Transactions of the Royal Canadian Institute, Vol. XIX, Part 2, 1933, pp. 161-248 plus index. The University of Toronto Press, 1933.*

Probably no part of Canada has received as long and as careful a study of its bird-life as that surrounding London in the southern extension of the Ontario peninsula. As early as 1882 the senior author collaborated with John Morden in "A List of the Birds of Western Ontario" in the "*Canadian Sportsman and Naturalist*". Since then he has been untiring in developing the ornithology of his area and, thanks to a tremendous amount of enthusiasm and energy, particular personal qualifications as a naturalist and an ability to embue others with his enthusiasm, the succeeding fifty years have produced data of particular value as well as a crop of observant assistant naturalists whose influence on Canadian ornithology has been marked. Mr. Saunders is today the Dean of Canadian Ornithology, of whose accuracy, experience and good judgment there can be no question. Mr. Dale is a well qualified graduate of the Saunders school and the two make an admirable team to collect and publish the accumulated results.

We have long looked for this list and are gratified at its appearance. It is no disappointment. Pages 161 to 164 are concerned with a description of the physiographic features of the country and the principal places cited, illustrated by an adequate sketch map stripped of confusing, non-essential detail, and an outline of the ornithological history of the area. Perhaps this latter might have been extended to advantage. In the text we get brief glimpses of the Mordens, the Holmans, the Keays, the Elliots, and others, and here might have been a good place to put something on record concerning them and their work. Following is an annotated list giving all pertinent data on the occurence of some 267 species with five hypothetical and four corrections.

The number of rare, casual or inconspicuous species cited is indicative of the keenness and close continuance of observation and the changes of fauna noted through the years of the length of time over which it has been active. Altogether this list is a distinct addition to Canadian ornithology.—P.A.T.

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The Canadian Field-Naturalist

VOL. XLVIII OTTAWA, CANADA, DECEMBER, 1934 No. 9

THE GRASSHOPPER SPARROW, Ammodramus savannarum AND LARK BUNTING Calamospiza melanocorys, IN SASKATCHEWAN

By F. BRADSHAW

THE unexpected happenings in bird study provide the observer with some of his choicest experiences. To add a new bird to one's list is an important event both to the beginner and the more advanced student. Quite recently I recorded making the acquaintance of the Dickcissel [*Spiza americana*] after it had evaded my observations for more than twenty-five years. This occured while playing golf near the city limits of Regina, about the last place one would expect to find such a rare species, and, virtually speaking, at one's own back door.

Golf led to the discovery of another species that heretofore had been recorded but once in Saskatchewan, by the late C. G. Harrold, who took a specimen at Lake Johstone in 1922, and sent it to England.

From the 12th tee on the Gyro Citizens' Golf Course, one mile directly west of the Parliament Buildings, Regina, I sliced a ball badly into the rough. While tramping aimlessly over the hummocky prairie in search of the ball my attention was arrested by the notes of a bird that was strange to me. I was no longer interested in golf and, fortunately being alone, I was free to abandon the game and devote my time to tracking down the unseen songster. I went in the direction from where the song came, but when I got there the song continued and seemed to be just as far away as ever. This procedure was repeated several times without my catching even so much as a glimpse of the singing bird. I finally concluded it was eluding me by running through the grass, and as the light was quickly failing I had, with reluctance, to postpone my search.

The problem was solved the next day, when a bird was flushed and alighted on a nearby telephone wire. With the aid of field glasses one recognized it as a member of the sparrow family. Its unstreaked, buffy throat and breast, the buff-coloured median line on the crown, and the sharp, pointed tail feathers were clearly noted, but the less conspicuous markings of yellow before the eye and on the bend of the wing were not discernible at this distance. However, by linking up the characteristics noted with the insect-like song of the bird one had little difficulty in identifying the bird as the Grasshopper Sparrow, and thus was added one more rare species to my Saskatchewan list.

After definitely making its acquaintance I was greatly surprised to find that this species was fairly abundant locally. Every vacant city block in the west end seemed to harbour one or more singing males, and there must have been at least fifty pairs in the vicinity.

Chapman interprets the song of the Grasshopper Sparrow as "*pit-tick, zee-e-e-e-e-e-e-e-e,*" and states furthur that, "under favorable circumstances the bird can be heard by an attentive listener at a distance of two hundred and fifty feet, but the casual observer would pass within ten feet of a singing bird and be none the wiser."

Several times I noted that the song would be preceded by a jerky quivering of the wings, and quite often the song described would be augmented by a faint tinkling warble. An entirely different note, presumably that of the female, was heard while searching for the nest. It was a faint, short, explosive "*thr-i-ips.*"

The species was first observed on June 21. On July 16 a nest and three young were discovered. Four days later the nest was found deserted. One dead young close by the nest, and a tailless female, indicated that possibly it had been molested. Another nest containing four fresh eggs was found on July 20, after many hours of fruitless search during the preceding month. This nest was located within thirty yards of a city dwelling that

harboured a large cat of bird-killing habits. In both cases the grassy nests were found in slight depressions on the ground, in rather long, fine prairie grasses among which there was a fair sprinkling of the snowberry bush.

Another flock of this species, of even larger proportions than the one referred to, was observed forty miles north of Regina, near Earl Grey, by Mr. F. G. Bard, of the museum staff. In this area were also observed Baird's, Leconte's and Nelson's Sparrows, [*Ammodramus bairdi, Passerherbulus caudacutus,* and *Melospiza lincolni*].

This year there was a tremendous increase of Lark Buntings [*Calamospiza melanocorys*] in the Regina district. Normally it is rather scarce in this area. It was by far the most abundant species on the prairies adjoining the city. In fact, I believe their numbers would exceed those of all other species combined. In a hundred-mile drive south of the city they were never out of sight and quite often one could see a dozen or more males in one spot. North of the city they became less numerous after a ten-mile drive, only one or two stragglers being observed in the next one hundred miles. A correspondent reports seeing a few at Jackfish Lake, north of Battleford, which point appears to be a long way from their normal range.

ADDITIONAL NOTES ON THE FLORA OF QUEBEC

By MARCEL RAYMOND

THE FOLLOWING is a summary of my botanical investigations in Quebec during the summer of 1933. For the results achieved, I am indebted to Prof. Marie-Victorin of the Universtiy of Montreal, who sometimes accompanied me and identified the rare specimens, and also to Prof. L. Deslaurier (Collège Saint Jean) who corrected the manuscript.

1. *Sparganium androcladum* (Englem.) Morong. When it was found I was with Prof. Marie-Victorin who said that it was the first time it had been discovered in the region of Montreal. On the Richelieu River, it grows at Ste. Therese Island with *S. eurycarpum,* and is quite common.
2. *Potamogeton crispus* L. Rare; near the same island.
3. *Anacharis occidentalis* (Pursh) Victorin. Very common at the same island growing with *A. canadensis.*
4. *Scirpus Torreyi* Olney. This sedge was nowhere to be found but on the banks of the Ottawa River. It also forms part of the flora of Ste. Therese Island, growing with numbers 1- and 5- near the bridge.
5. *Juncus compressus* Jacq. This glaucous European Juncus is very rare in America. In Quebec, it was found in the two following places: (a) Les Plaines d'Abraham (Pease 1904) and (b) Murray Bay (Malbaie) (Eggleston). The North American area of this plant is therefore: New York State (two different places, K. M. Wiegand and A. J. Eames), Newfoundland (M. L. Fernald and Wiegand), Quebec (three different places, Pease, Eggleston, Victorin and Raymond).
6. *Arisæma Stewardsonii* Britton. In his most interesting paper "*Les Spadiciflores du Quebec*", Contrib. Lab. Bot., Univ. Montreal, Number 19, Prof. Marie-Victorin wrote that this member of the family Araceæ was attributed to Quebec by but two doubtful specimens:1.—Cleveland, Richmond County, (Chamberlain and Knowlton, July 26th, 1923); 2.-Cedar Swamp, Georgeville, (A. S. Pease 12085). On the 25th of May while collecting on the island, I found large colonies growing in the woods of *Pinus Strobus* L. and *Betula populifolia* Marsh.
7. *Polygala paucifolia* L. In Quebec this Polygala was known in the East at the following places: Mingan Seigniory (D. N. St. Cyr) and probably in Gaspesia. At Iberville, (33 miles from Montreal) there is a sterile colony of this beautiful "orchid-like" plant. No fruit has been found in autumn.
8. *Polygala viridescens* L. (*P. sanguinea* L.) Three spots where this plant grows were also discovered this year, which are the first in Quebec, namely Iberville, Farnham (near a large bog), and Contrecoeur.
9. *Utricularia resupinata* B. D. Greene. This very tiny species was not known in Que-

bec previously. Prof. Marie-Victorin found it near Timagami Lake, Ontario. I have found my specimens in the Laurentian Mountains, in Lake Tiberiade (Nomingue) where they grew with *Utricularia cornuta* Michx., *Juncus pelocarpus* F. Meyer, *Juncus articulatus* L., and the delicate *Lobelia Dortmanna* L.

10. *Utricularia purpurea* Walt. This species was also unknown in our province. A sister of Sainte Anne (S. Marie Jean Eudes) gathered it in the lakes at Rawdon, growing with *Nymphozanthus variegatus* (Engelm.) Fernald and *Brasenia Schreberi* Gmel. She found no flowers but Brother E. Roy c.s.v. found this aquatic plant in bloom at Nomininge, also in the Laurentian mountains.

11. *Littorella uniflora* (L.) Asch. (*L. lacustris* L.) One of the rarest plants in America. Brother M. Victorin found it at Natashkwan (North Shore of St. Lawrence River). Quite common along the Richelieu River with *Isoetes.*

12. *Centaurea maculosa* Lam. A European weed actually developing in Quebec. The first specimens known here are from Mount Johnson, near the St. Johns—Marieville highway.

SOME AMPHIBIANS AND REPTILES OF THE DISTRICT AROUND HIGH RIVER, ALBERTA, 1933.

By ROY L. FOWLER

THE DRY conditions of the last three years have materially lessened the number of amphibians in the district around High River. In the prairie country, the Big Lake, six miles east of High River, has dried up for the first time since 1895. The Blizzard Lakes, fifteen miles northeast of town, are now just alkali flats. The park belt of the foothills, twenty miles west of town, has not suffered so much from drought; but even there I saw many dried up swamps this summer.

The following list is probably not complete as I was unable to put sufficient time on this work.

SALAMANDER. *Ambystoma tigrinum.* — The Tiger Salamander is most commonly met with in our cellars and roothouses. In the fall of 1932 I saw several Salamanders on roads and paths. They did not appear to be traveling in any particular direction, and yet all were at least half a mile from the nearest water. This summer, in a pond near the Millarville school, some boys caught a larval specimen the gills of which had not yet begun to shrink.

TOADS.—Toads are rather scarce, and only to be found in the park belt along the foothills. Out on the prairie, along the Highwood or Sheep Rivers, I have never seen a toad.

Bufo boreas boreas.— A Northwestern Toad was found by my father on his ranch in the foothills. It was settled down in a little shady hole and apparently quite comfortable during the heat of the day. It was not in the timber but in an open grassy glade.

Bufo hemiophrys. — Mr. Clyde Patch suggested that the Canadian Toad ("Crested Toad") might be found in this district. I have never seen one here nor have I been able to get in touch with anyone who has.

FROGS. *Rana cantabrigensis.*—The Northern Wood Frog may be found in any swampy place throughout the foothills district west of here. I noticed that, though there was no water in many swamps, the ground was not sufficiently dry to retard the growth or activity of these frogs.

Pseudacris nigrita septentrionalis. — The Northern Swamp Tree Frog is found in the foothills and on the prairies wherever sufficient water will accumulate for mating and spawning. By the middle of April the melting snow usually makes many ponds and temporary sloughs in which frogs may be found. By the end of June these ponds were bone dry. In August I have seen partly grown frogs of this species hopping around in healthy condition although the slough bottom was so dry as to be deeply cracked. The cracks were several inches wide and eighteen to twenty inches deep. The little frogs apparently kept their bodies moist by hiding down in these cracks during the heat of the day. Fall moisture nearly always makes sufficient mud to

render hibernation possible. Late in the fall I have seen partly grown specimens away from all water or slough bottoms. I doubt if these survive.

SNAKES.—Thirty years ago my mother saw a large black snake coiled in a tree on the bank of the Highwood River.

Thamnophis radix.—The Plains Garter Snake is frequently seen along the Highwood River. It is seldom met with away from rivers or other permanent water, although last year one came into my house yard, which is two miles from the river.

Crotalus confluentus confluentus—The Prairie Rattlesnake has never been seen in this district, though it is found fifty miles east of here.

TURTLE.—No species of turtle has been found here.

I am indebted to Mr. Clyde L. Patch of the National Museum of Canada, Ottawa, for the identification of specimens.

ENGLISH SPARROWS AT VINELAND STATION, ONTARIO

By A. D. HARKNESS

WISHING to attract song and plumage birds to my grounds at Vineland Station, I constructed and erected nesting boxes for martins, wrens and bluebirds. The English sparrows which had been noticeably numerous, now became a decided nuisance. They built in the martin and bluebird houses, killed the young of the bluebirds, driving away the adults and engaged in almost continuous conflict with the wrens.

During the autumn and winter the hens are fed for the most part in the henhouse. As the front is open except in extremely cold weather, the sparrows flocked in to feed with the hens. Hoping to reduce, somewhat, the number of sparrows in the vicinity, a screen trap door was fixed on the open front of the henhouse. This trap could be sprung from the barn. In this way some satisfactory catches were made during the winter.

As it seemed advantageous to take the sparrows continuously throughout the year, a trap was constructed and placed in the henyard. The trap selected was the Funnel Trap (Dearborn 1926).

The number of sparrows which have been taken in the henhouse and by means of the trap is summarized in Table 1.

Month	1926	1927	1928	1929	1930	1931	1932	1933	1934	Total
January		11			43				23	77
February		5							20	25
March		9								9
April		4		7	10				21	42
May	23	68		11	19	17	15	55	15	223
June	223	276	215	150	221	219	197	239	214	1954
July	529	303	65	228	72	36	296	205	46	1780
August	90	99	11	247	13	69	86	139		754
September	97	55	12	36	19	80	118	124	12	553
October	50	44	27	75	53	13	62	112		436
November	68	30	25	217			69	118		527
December	42			342			49	98		531
Total per year	1122	904	355	1313	450	434	892	1090	351	6911

Table 1. Giving the number of sparrows taken per month in the henhouse and by means of the Funnel Trap from May, 1926, to October, 1934.

During the winter of 1925-1926 about 230 sparrows were taken in the henhouse of which 80 were taken in one day.

During one calm day in July, 1926, the trap was emptied three times, yielding a total of 90 birds.

Of the 217 taken in November, 1929, 107 were taken in the henhouse. The 342 in December, 1929, the 43 in January, 1930, and the 49 in December, 1932, were all taken in the henhouse.

No sparrows were taken in the henhouse, and the funnel trap was not set from November 20, 1927, to June 1, 1928, from November 18, 1928, to April 15, 1929, during February and March, 1930, from October, 1930, to May, 1931, from October, 1931, to May, 1932, and from December, 1932, to May, 1933.

It was noted that the trap would catch sparrows more quickly after one or two had entered. These first individuals appeared to act as decoys.

There was at all times a supply of grain in the funnel and cage of the funnel trap and yet the daily catch varied greatly. This is demonstrated by Table 2, which gives the catch over two periods chosen at random.

The greatest number of birds was taken during June and July. The majority of these birds appeared to be young as it was observed that the bones of their necks and skulls were notably softer.

An examination of Table 1 shows very little, if any, falling off in the number of sparrows being taken. In spite of this there appear to be fewer in the immediate vicinity; they come in from the surrounding districts and are soon captured.

This record has two points of interest. The number of sparrows taken is indicative of the abundance of this species at this time and it gives a very clear idea of what may be expected in the way of a catch from the operation of the funnel trap net over an extended period.

Funnel Trap				Henhouse	
Date 1927	No. of specimens	Date 1929	No. of specimens	Date 1929	No. of specimens
Aug. 9	8	Nov. 2	4	Nov. 18	61
" 10-15	0	" 3	19	" 19	11
" 16	6	" 4	12	" 28	35
" 17-22	0	" 5	11	Dec. 2	22
" 23	5	" 6	9	" 3	35
" 24	12	" 7	9	" 4	17
" 25	5	" 8	9	" 10	110
" 26	10	" 11	8	" 11	11
" 27	0	" 12	8	" 18	38
		" 13	5	" 20	87
		" 14	8	" 24	21
		" 15	2	" 30	1
		" 16	6		

Table 2. Showing the daily catch by means of the funnel trap and henhouse over two periods.

Literature

Dearborn, Ned. 1926. The English sparrow as a pest. Farmers' Bulletin 493, U.S. Dept. of Agriculture, Washington, D.C.

THE FOOD OF YOUNG SPRING SALMON IN SHUSWAP LAKE, B.C.

By W. A. CLEMENS,
Pacific Biological Station, Nanaimo, B.C.

DURING early July in each of the years 1931 and 1932, large numbers of young Spring Salmon, *Oncorhynchus tschawytscha*, were observed in the shoreward waters of Shuswap Lake, near Sorrento, British Columbia. In the late afternoon and evening, these fish were everywhere breaking water and evidently feeding upon winged insects which were flying over the surface. By means of a seine, considerable numbers of the salmon were obtained at various times of the day and on several days of each year. A random sample has been measured, weighed, scales examined and stomach contents studied.

The standard lengths of 44 fish ranged from 5.2 to 8.3 cm. The weights varied from 2.7 to 8.4 g.

Examination of the scales showed that the fish were in the first year and counts of the scale circuli of 20 individuals gave a range of from 4 to 11 with an average of 7.

The fish appeared to be in excellent condition and reports from the outlet of the lake indicated that numbers were commencing the seaward migration.

The food of 64 individuals was examined and found to consist largely of terrestrial insects, small Crustacea and midge (Chironomidæ) larvæ, pupæ and adults. Among the terrestrial insects were species of Diptera, small Hymenoptera, a few Aphidæ and Corixdæ and other Homoptera and Heteroptera, add an occasional Coleopteran. Daphnia was by far the most abundant of the small Crustacea but there were considerable numbers of Bosmina and Eurycercus and a few smaller Cladocera and Copepoda. Only a single small Gammarus occured. The Ephemeridæ were represented by nymphs only and chiefly Ephemera with a few representatives of the Heptageninæ and Bætinæ. Trichoptera larvæ occured in two stomachs and an adult in a third.

The results may be summarized as follows: terrestrial insects in 47 stomachs: Crustacea in 43; Chironomidæ in 15; Corixidæ in 4; Trichoptera in 3; miscellaneous; Hydracarina, Arachnida, Aphidæ, Corethra larvæ and Formicidæ.

Examination of the stomachs of Squawfish, *Ptychocheilus oregonensis*, taken during the same periods as the salmon, showed that the Squawfish were feeding to a large extent upon the salmon (Clemens and Munro, Bio. Bd. Can., Prog. Rept. Pac. no. 19, 1934).

The present information concerning the Spring Salmon is placed on record as a small contribution to the knowledge of the life-history of this important species.

NOTES AND OBSERVATIONS

UNUSUAL ROOSTING OF TREE SPARROW.—It is well known that grouse and some field-loving birds, such as Snow Bunting and Horned Lark nestle amid the snow to spend the night. But one would hardly expect a small bird usually inhabiting sheltered thickets to resort to such a means of roosting.

On December 26th (1933) at Toronto we were visited by a snow-storm, borne on a cold north wind that lasted most of the day. Towards evening I went for a walk out into the open country near my home, more with the idea of enjoying the storm than hoping for any bird observations. As I paused near a solitary thorn bush well out on the field, I saw a small bird come flying across the field and settle in the bush a few feet from me. I was surprised to find it to be a Tree Sparrow. This species is by no means rare at this time of year, but to find one lone individual on a barren snowy field in the fading light aroused my curiosity. As I watched him he flew to the weed tops in several places, back to my bush, to the reeds, then far away across the field to a discarded tin half-buried in the snow, and finally returned to my bush. At each place I noticed he flew down and nestled low in the snow, and at the bush he crept into the small bowl-like hollow caused by the

eddies that had swept the snow clean of the trunk of the thorn. It was clear with the gathering dusk that the bird was seeking shelter for the night, certainly not feeding for he gave the weed-seeds no attention. His next move was to fly some distance to another thorn-bush to the north and disappear near its base. I kept an eye on this bush, and lingered some time in the neighbourhood; but as he did not appear, it seemed that he intended to spend the night at that spot. But how? What shelter could the open branches of a thorn-bush on a wind-swept field amid a snowstorm afford? There was only one other place—the snow itself. I approached cautiously and found a small hole in the side of the eddy-formed snow bowl round the trunk. It looked like a Mic-otus tunnel, but as I knelt in the snow to peer in, a sparrow's head and bill appeared. There was a flutter of wings and, uttering the familiar *cheep*, a Tree Sparrow flew out and vanished in the gloom.

Examination of the hole showed it to be clean and freshly made, extending into the snow some 8 inches, ending abruptly. It was not a Microtus run for it did not extend down into the grass. Clearly the sparrow had burrowed his way into the drift to spend the night, and during my observations of the last fifteen minutes he had been seeking a suitable spot.

It is difficult to say why one lone Tree Sparrow should have sought an open wind-swept field amid a blizzard to find, apparently with difficulty, a suitable place to roost, especially when we consider that at the same moment probably many other Tree Sparrows were settling down in some dense cedar in the sheltered ravine at the edge of the field. But it is just such departures from the usua that make bird study so fascinating, particularly when such observations come unexpectedly.

I wonder what we miss when we stay indoors?—STUART L. THOMPSON.

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24 Bywater Street,
CHELSEA, S.W.3,
June 3rd, 1933.

DEAR MR. BILL,

I hope you haven't forgotten me and our discussions on birds. I remember the letter your brother (I think it was) sent you from England about the birds there. It was useful. The trouble about coming to a completely new country is that you know less than nothing. I was terribly excited the first time I saw a chaffinch, and I now know that it is one of the very commonest birds.

I went to the Natural History Museum, and that gave me some idea. There was a special set of the common birds, each in a separate glass case in their natural surroundings. It was a marvelous way of identifying, only I don't really think the birds were stuffed as well as ours. There was also a special case of birds within a radius of three miles from the heart of London; it was extraordinary, but there are over a hundred. The ducks and water birds all come to the ponds in the parks and behave exactly as if they owned them. I used to think they were tame birds; they allow themselves to be approached and fed, and they waddle across the path to the green grass and have an unperturbed snooze among the crocuses or the tulips.

The English birds that I have really become attached to (because I am very pro-Canada) are the Water Wagtail and the Lapwing. The Wagtail is an exciting little bird; he is so dainty and every move is completely unexpected. He even flies in loops and dodges. Have you ever heard the music on the piano called "Water Wagtail" by Cyril Scott? It is very like him. He is a bird with a real sense of humour. I expect you know what he looks like. The Lapwing is very inconsistent. When he is in the fields he looks very trim and neat—so carefully groomed and rather dainty with a thin elegant crest; but when he goes into the air he looks like a large heavy long-winged bat. He is rather like one of those gliders without an engine with very oblong lengthy wings. He has also a double voice. He makes one quite thrilling noise like a silver telephone bell—a very silver sound, but definitely a telephonish one; the other is a sea-call.

I am very annoyed with the chaffinch. One morning in the Isle of Skye at dawn he came to my window, sat in a tree and sang the most optimistic bubbly kind of song. He kept it up till I felt optimistic and bubbly too, and decided to get up and see the sun rise. Well, I did get up, and when I opened the front door it was pouring rain. This is just a warning not to put any faith in a chaffinch.

The thrushes have that throaty song that all thrushes have and the blackbird too — he is perhaps even better; but not to compare with our wild unattainable mystic hermit thrush. Perhaps I am prejudiced, because he sings in the

deep green woods at dusk in the silence—the special perfect kind of silence for a singer like he is—but even so, I think you would agree with me.

By the way, do you remember how we both despaired of knowing the differences between casual grey-cheeked and olive-backed thrushes? Well, I know a sure way now. It is their songs. One is a descending one. There is a very good book called "Wild Birds and their Music", by (I think) Frank Schuyler Mathews. I was able to identify a lot I was misty about through it. Even if you don't know music just the very look of it going up and down or along and up should be enough. There is an exciting little Winter Wren on the side of Kingsmere Mountain who sings a bubbling, quite long and varied canary song in a green jungley swamp.

I like the shape of Rooks. They are funnier than crows, and there is something rather nice about a rookery.

I am going to Sweden on the 17th of June, and it will be fun to see what differences there are in their birds. I hope the same books will do. They are in so many volumes and so expensive here. There are no handy reliable little guides.

I hope this letter hasn't bored you. You are, I think, my only real Bird Friend. I was very sorry to hear you have been poorly this winter. I hope you are better now.

Yours sincerely,

(*SGD.*) BETTY SMART.

NOTE ON THE SONGS OF THE NORTHERN THRUSHES.—Miss Smart's comment on the songs of the Olive-backed and Gray-cheeked Thrushes indicates quite rightly that these two species, which look very much alike, are easily distinguished by their songs when these can be heard. Unfortunately, neither of these Thrushes sings much on migration, though on their breeding-grounds their songs are frequent in the season of courtship and nesting.

While I cannot claim either musical training or ability, it is my impression that each distinct series of notes in the songs of the Olive-backed Thrush is an ascending series and that usually several successive series in the song of an individual Olive-backed begin on the same note. Moreover, most of the notes of the Olive-backed Thrush are clear and full-toned and may, I think, be called flute-like. In this respect they resemble the notes in the songs of the Hermit Thrush. Most of the series of notes in the songs of the Hermit Thrush are, however, descending series, at least in part, and no two successive series of notes sung by this species begin on the same note.

The song of the Gray-cheeked Thrush on the other hand, while composed of notes arranged in distinct series, in each of which at least a part of the notes are often arranged in a descending order, is not clear or full in tone, but is rather metallic and grating, showing in this regard a distinct resemblance to the song of the Veery. The call notes of the Gray-cheeked Thrush also have a marked resemblance to the call notes of the Veery.

While the Gray-cheeked Thrush and the Olive-backed Thrush resemble each other very closely indeed in appearance, the evidence of their voices, which is probably valid evidence, indicates that the relationship between them is not as close as that between the Olive-backed Thrush and the Hermit Thrush, or that between the Gray-cheeked Thrush and the Veery.—HARRISON F. LEWIS.

RECORD OF *Ovalipes ocellatus* (Herbst) FROM GULF OF ST. LAWRENCE.—In September, 1932, a crab was obtained from lobster fishermen at Pointe du Chene, in Northumberland Strait. On examination the crab proved to be *Ovalipes ocellatus* (Herbst). The specimen was a female, with a carapace length of 6.6 cms., the greatest width of the carapace being 8.3 cms. Another specimen was observed at West Point, Prince Edward Island, in September, 1931. Although apparently not plentiful in Northumberland Strait area, it is probably not rare since the local fishermen have a special name for it and call it the "China Crab," a name derived from the colour pattern of its carapace.

Previous to these two records the supposed range of *O. ocellatus* has been from Cape Cod to North Carolina with a record by Leim from Minas Basin, Bay of Fundy (Rathbun, 1929, p. 21)*.—W. TEMPLEMAN. *McGill University, Montreal.*

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* Mary J. Rathbun. *The Cancroid crabs of America* Bulletin 152. Smithsonian Institute, U.S. National Museum, Washington, 1930.
Mary J. Rathbun, *Decapoda.* Canadian Atlantic Fauna, 10M 1929. Biol. Board of Canada.

A RARE LILY FOUND ON THE ISLAND OF MONTREAL.—While visiting near Lachine, Quebec, six years ago, I went for a walk to La Salle's Windmill on the road to Verdun. On my ramble down that beautiful and shaded roadway, I was attracted by a Lily growing in a great mass by a little runlet that fell over a cliff across the road. It grew in a great flat whorl of flowers as large as a saucer with a stem from one foot to five feet long, flesh pink in colour, and similar to the "Agapanthus" a native of Africa, and a hot-house plant. I found it afterwards along the shore and the whorl of pink flowers gets larger as the plants reach maturity; the roots are similar to the African flower not unlike Iris or Flag roots.

I never saw it in my botanising trips in Muskoka, Parry Sound or Algonquin Park or the many spots in southern Ontario I had visited often. It grows in and near water or ground that is always moist. I noticed it a week ago in a swamp on the way to "Bord à Plouffe" made famous by Dr. Drummond in his poems.

For want of a better name I called it *Agapanthus canadensis.*

On submitting the plant in flower to Dr. Douglas Storms, our best authority on botany, he found it to be *Butomus umbellatus* L., A plant of the related family "Butomaceæ" with many ovulated ovaries, rose-coloured flowers; native of Europe and Asia, has been found on the shores of the St. Lawrence river near Montreal.

It would be a beautiful addition to any one who has a pond or water garden. This lily seeds and bears lots of fine seeds. I planted some below McMaster and back of the George Allan School, and someone may find it later on.

I brought home some plants for my own garden and the garden of friends which I hope will succeed in this warmer climate. It is a wanderer from Europe.—H. C. DEMPSEY.

DR. M. O. MALTE

A final paragraph may appropriately be added to the biographical note on Dr. M. O. Malte which appeared in our issue for September, 1934.

He left Ottawa early in July, 1933, to accompany the annual Eastern Arctic Patrol and was actively engaged in field-work round the shores of the Ungava Peninsula and the east coast of Hudson Bay when his final illness attacked him. Much against his will he was persuaded that it was impossible for him to continue on the expedition and he most reluctantly allowed himself to be transferred from the R.M.S. *Nascopie,* then at Charlton Island, in James Bay, to Moosonee, where he took train to Ottawa, with a nurse in attendance. It was on the train, only a few miles from Ottawa, that he died on the 12th of August, 1934. With almost his last words he sought reassurance that his field notes and specimens, collected only a few days before, were safe and would be forwarded to the National Herbarium in Ottawa.—H.F.L.

CORRECTION.— Through inadvertence the third paragraph on page 100 of the current volume, in the issue for September, 1934, was incomplete as published. It should read as follows:

"The next year this colony contained 5 occupied nests, which were in positions similar to those used in 1931, and in which young were successfully raised. As individuals of this species do not breed in the first year after that in which they are hatched, the additional pair of birds that nested here in 1932 could not have been hatched in this colony, where no young were reared before 1931, but probably were natives of the colony on Lake Island, which is the only other colony of this species known to be on this coast."—EDITOR.

REVIEWS

THE DEFORMATION OF THE EARTH'S CRUST. *By Walter H. Bucher, Princeton University Press, 1933, 531 pp., 100 figs.*

Dr. Bucher is professor of Historical Geology in the University of Cincinnati. In this volume he has attempted to assemble the essential geological facts that bear on the problem of crustal deformation. The approach is by the inductive method and his generalizations are designated as "laws". Other conclusions of an interpretative nature are listed separately as "opinions". For each of the laws one or more examples are given in sufficient detail to enable the reader to judge for

himself the nature of the facts generalized in the "law". The reader is invited to test these generalizations from his own field experience.

The book is one which will be read with a great deal of interest by every student of earth tectonics. The general conclusion reached is that the geosynclinal belts originated as zones of weakness during periods of tension when the earth was expanding, and that the mountain belts were produced by compressive forces during succeeding periods when the earth was contracting. Not only is there abundant structural evidence that tension, as well as compression, has produced deformation of the earth's crust, but experiments in which spheres were made to expand and others to contract gave deformation patterns simulating those of the geosynclines, and the younger mountain belts respectively. The cause of the alternating subcrustal expansion and contraction is not discussed in detail but it is believed to be controlled by fluctuation in the heat content of the subcrustal body of the earth.

The chapter titles indicate the subjects dealt with. They are: 1. The Mobile Belts; 2. Isostasy; 3. Continental Margins and Intra-Continental Mobile Belts; 4. The Pattern of the Mobile Belts; 5. The Diastrophic Cycle; 6. Marginal Deformation; 7. Deformation within the Welts; 8. Special Aspects of Orogenic Deformation; 9. The Intrusives; 10. Heterogenous Mobile Belts and Faulted Belts of Low Mobility; 11. Space Relations of Mobile Belts; 12. Time Relations of Mobile Belts; 13. Epeirogenesis; 14. Summary and Synthesis; *Appendix*: Laws; *Index*.—F.J.A.

HAND BOOK OF FROGS AND TOADS. *By Anna Allen Wright and Albert Hazen Wright, Professor of Zoology, Cornell University. The Comstock Publishing Co., Inc., Ithaca, New York, 1933: 231 pp., 82 pls., 7 figs. $2.50.*

This handbook of the frogs and toads of the United States and Canada deals with eighty-six species and subspecies of Salientia. The seven sets of figures comprise thirty outline drawings illustrating structural features. The eighty-two plates, made up of from three to nine photographs, show various views of adult specimens and, in some cases, eggs and tadpoles. Most of the photographs were made by the authors, and most of them are of living specimens. Only a person who has attempted to photograph amphibians and reptiles can appreciate the vast amount of time and patience required to make these hundreds of pictures. The key to families is quite workable, though, while admitting they are unavoidable, it must be said such comparative terms as "narrower, thinner, and longer" referring to a previously mentioned species are sometimes difficult to interpret. Fifteen pages are devoted to a classified bibliography.

The discussion of most species is carried out in the following order: common names, scientific name, range, habitat, size, general appearance, structure, voice, breeding, notes. In a few cases the voice or the breeding habits are unknown. Under "notes" an occasional reference to food occurs. Perhaps a brief paragraph on feeding could have been advantageously inserted in the general account, and possibly the ranges of certain species could have been more accurately outlined. As *Bufo a. copei* is found at the south end of James Bay, it is doubtful if *B.a. americanus* can be said to range as far north as Hudson Bay. The National Museum of Canada has examples of *B. hemiophrys* from Saskatchewan and from Edmonton, Alberta, and Edward A. Preble took a specimen at Fort Smith, Northwest Territories. *Pseudacris n. triseriata* is common at Ottawa, Ont.

A commendable feature of the book is the allotment of two full pages to each species, thus allowing the name, the illustration and part of the text consistently to occupy the left hand page. The authors make no mistake when in the preface they express the hope that this book will be a guide for teachers, students and younger naturalists. In the general account many interesting facts of popular interest are stated. Here we read that in general all male toads and frogs have voices, and that some females talk, croak or scream. The vocal sacs of the males are described. The eggs and egg-laying are discussed, and we learn that a bull-frog may lay 20,000 eggs. The development and transformation of the tadpoles, from the egg to a limbless, two-legged, three-legged and four-legged little creature with the structure of the adult, are portrayed by word and picture.

The splendid illustrations, concise text, strong binding and flexible covers make the Handbook of Frogs and Toads an essential book in any public or private library that has even a slight trend to either scientific or popular natural history.—C.L.P.

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